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POWER AND GAS

Devoted to the Conversion, Transmission and Distribution of Energy

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THE SAN FRANCISCO HOSPITAL POWER PLANT

BY ALFRED H. POTBURY.

The San Francisco Hospital will ultimately represent an expenditure of about two million dollars. The site of this institution, at Twenty-second and Potrero avenue, is 866 feet by 760 feet with plans for three general groups of buildings, one general hospital group, one infectious group and one tubercular group.

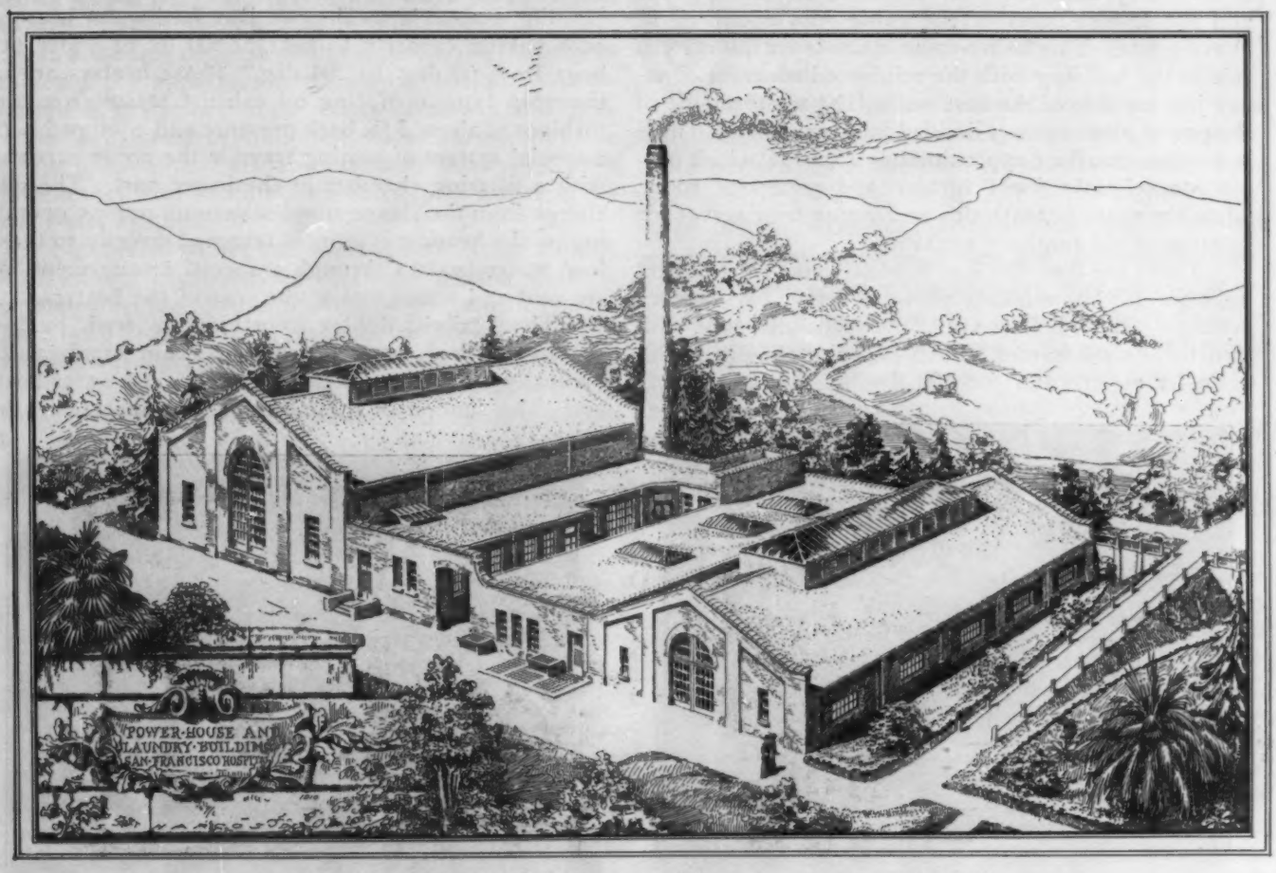


Fig. 1. Power House and Adjacent Buildings, San Francisco Hospital.

The general hospital group now nearing completion includes administration, service and receiving building, four ward buildings, a nurses' home, a laundry and power plant building. Interconnecting all these buildings is a wide enclosed passageway beneath which in the basement is a similar passage or tunnel about 10 ft. square. The basement passage serves a dual purpose, that of a transportation way for supplies to and from the various electric elevators in each building and also as a conduit for the installation of various pipe lines and electric services distributed from the central power plant.

The size of these buildings, their unity of purpose, and the demands made by their equipment leads naturally to a power plant. Light, power, heat, steam and water must be ready as required.

The power plant building, shown in Fig. 1, is centrally located in the final completed plan which includes all three hospital groups, so that the matter of distribution will always be an economical one. The

power plant building includes also under the same roof, the laundry plant, the disinfector, the incinerator and refrigerating plant, but the power plant proper is separated from these other departments by partition walls

Fig. 2. Boilers and Settings During Construction.

which enclose a space approximately 70x75 ft. in size. The larger part of this space, forming the boiler room, is one story with the floor about 10 ft. below grade and the lowest point of the gable roof about 19 ft. above grade. This boiler-room space is on the eastern side of the building with the reinforced concrete chimney just outside of the east wall. The western side of the power plant room is divided into two stories. There is a mezzanine floor approximately 25x70 ft. which provides excellently for a turbine and generator room, while the space beneath this mezzanine floor serves for location of all auxiliary apparatus.

There are four 250 h.p. Risdon water tube boilers built for 175 lb. working pressure set in two battery settings. These boilers are of the suspended type with structural steel frames. Each boiler is equipped with a Foster superheater for 100 deg. superheat. Fig. 2

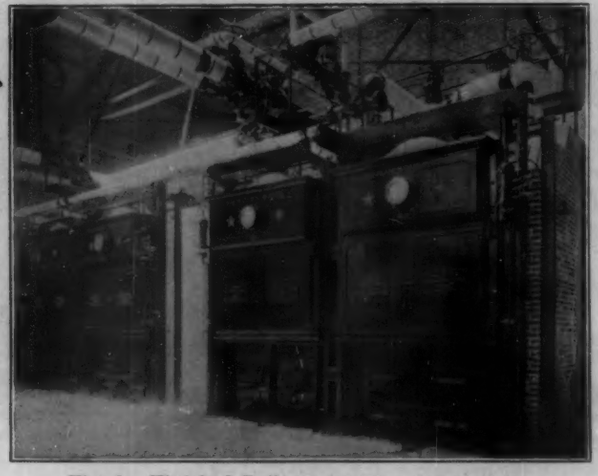


Fig. 3. Finished Boilers and Pipe Connections.

gives a general view of boilers and superheaters as they appeared during construction, with one battery about ready for the brick work. Fig. 3 shows boilers after completion of the plant and gives an idea of various pipe connections, main header, auxiliary header, runway for access to the various valves and the distributing lines leaving the boilers.

To the right of the boilers on the north side of the boiler room is the oil apparatus, which is the Dahl Mechanical Atomizing System made by the Union Iron Works. This system consists of a double set of 4½x2¾x4 duplex pumps, two No. 4 oil heaters, duplex

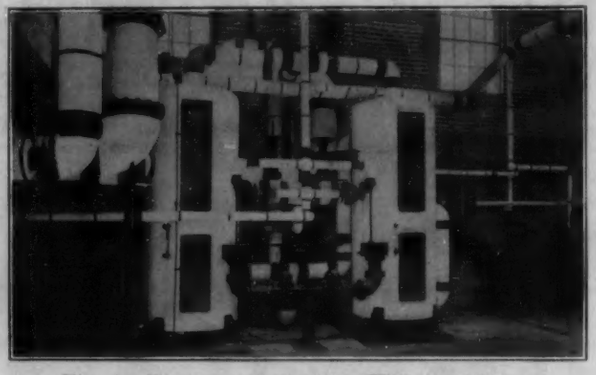


Fig. 4. Heaters and Purifiers With Auxiliarry Apparatus.

strainers, governor, thermometers, etc., as required to supply the eight burners. On the right side of Fig. 4 the oil apparatus is shown.

Fig. 4 also shows the two Day feed water heaters, each having capacity to heat 52,500 lb. of water per hour from 60 deg. to 204 deg. These heaters are of the open type, operating on exhaust steam from the turbines at about 3 lb. back pressure and equipped with a special system of heating trays in the upper part and with a filtering chamber in the lower part. The discharge from the Deane simplex vacuum pumps, operating on the heating system, is returned directly to these feed water heaters through a special arrangement for air vent and water seal at the rear of the heaters.

The 10x7x10 duplex Worthington feed pumps, shown in Fig. 5, are controlled in steam supply auto matically by the control valves at the feed water heaters. The suction of these pumps is connected to the

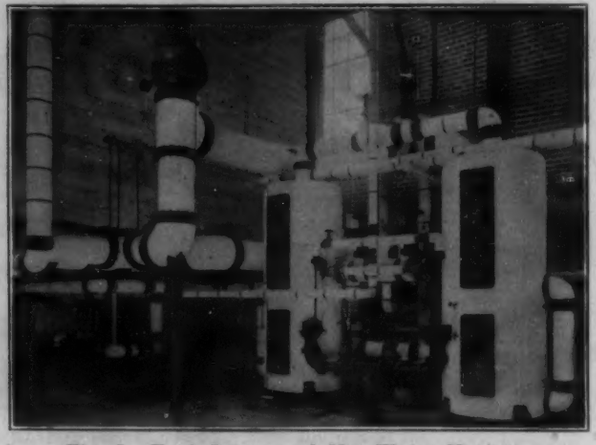


Fig. 5. Feed Pumps and Hot Water Heaters.

feed water heaters in which a constant level at filtering or suction chamber is maintained by the automatic steam supply valves to feed pumps. Any make up water necessary is hand controlled and is supplied through the top of the heaters.

To the left and at the rear of the feed pumps in Fig. 5 can be seen one of the two condenser type of domestic hot water heaters of the Blake Manufacturing

Company's make. These have a guaranteed capacity of 3000 gal. per hour from 50 deg. to 180 deg. The temperature is automatically controlled. These heaters operate on 3 lb. exhaust steam pressure with Dunham vacuum traps on the return to allow condensation to pass directly to suction of vacuum pumps.

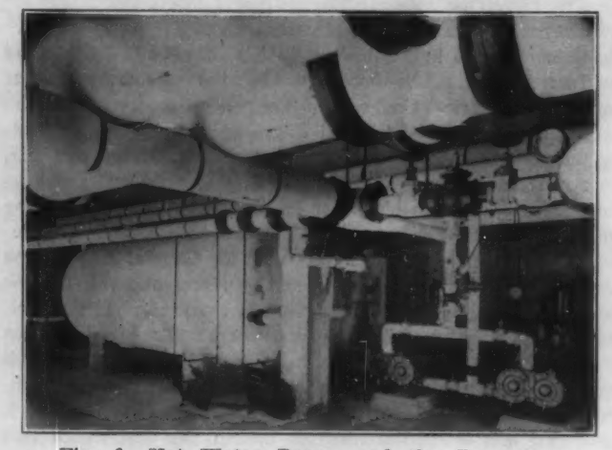


Fig. 6. Hot Water Pumps and the Emergency Hot Water Heater.

To the left of these domestic hot water heaters in the auxiliary apparatus space are the 10x7x10 Worthington domestic hot water pumps as shown in Fig. 6. These are for circulating hot water throughout the entire hospital and are automatically controlled by a Mason regulator to maintain a constant pressure in the hot water system.

Fig. 6 also shows the domestic hot water storage tank having a capacity of 3200 gal. This tank is equipped with a double brass pipe coil which is supplied with reduced pressure steam at about 40 lb. and which gives a secondary method of heating water used chiefly as emergency method in conjunction with the Blake heaters already mentioned. At the rear of the hot water storage tank is a returned tank for water storage having a capacity of 2500 gal. At the left of the hot water storage tank in Fig. 6 the steam ends of the 10 x 14 x 18 Dean vacuum pumps can be seen.

Fig. 7. Turbo-Generator Room, San Francisco Hospital.

These are controlled by a Mason vacuum governor to maintain a constant vacuum on the heating system return from the buildings.

Over the auxiliary apparatus room on the mezzanine floor is the turbine room, a general view of which is shown in Fig. 7. There are four 125 kw. General Electric Company turbo-generators arranged for three-wire distribution for 125-250 volts. The turbines are supplied with steam at 175 lb. pressure and 100 deg. superheat. The exhaust against 3 to 5 lbs. back pressure into the 16-inch main exhaust line to the heating system. The switchboard at the far end of the room is of General Electric Company's manufacture and is especially designed to meet the requirements of about twenty feeder circuits which pass out through the service building and thence to the main tunnel.

This entire installation was designed and supervised by the Mechanical Department of the Bureau of Architecture of the City of San Francisco. The power plant contract was executed by Robert Dalziel Jr. and the electrical installation by the Central California Construction Company.

POTENTIAL WATER POWER OF THE UNITED STATES.

The possible development of western water power is amazing. A resume of data collected by the Commissioner of Corporations at Washington in regard to this feature of undeveloped natural resources is herewith appended:

The statistics for undeveloped power are far from satisfactory. In the first place, many of the undeveloped power sites in the United States have never been surveyed or even examined, and in the second place, even where examinations and surveys have been made, the estimates of power are necessarily based upon certain engineering theories that are liable to error. In the investigation conducted in the field by this Bureau no effort was made to secure estimates for undeveloped power, except for those concerns that reported some undeveloped power. Estimates of the undeveloped water power in the United States were prepared (1908) by the United States Geological Survey for the National Conservation Commission. The difficulty of arriving at an accurate estimate was frankly admitted by the Survey.

From the data furnished by the Geological Survey there has been prepared in this Bureau a table of this power by states. It should be emphasized that this rearrangement is more or less arbitrary. For example, in many cases the drainage basin of a river extends over several states and it is difficult to allot the power possibilities of such a basin among the states involved. It is believed, however, that the distribution made is reasonably accurate. The table shows the power as computed by the Geological Survey on a basis of 90 per cent efficiency, and also on the basis of 75 per cent efficiency, adopted by this Bureau. It should be noted that the total figures given in this table on the basis of 90 per cent are not identical with those originally prepared by the Survey. The estimates of the Survey include nothing for the State of Pennsylvania, whereas they include the entire power of the Niagara River. These figures have been readjusted and minor readjustments have been made in other instances.

Table 6—Potential water power in the United States, by States, as computed by the United States Geological Survey and as revised by the Bureau of Corporations.

	Potential horsepower on basis of 90 per cent efficiency.		Potential horsepower on basis of 75 per cent efficiency.	
	Minimum	Assumed Maximum	Minimum	Assumed Maximum
United States..	32,083,000	61,678,000	[1]26,736,000	[1]51,398,000
Western States:				
Montana ...	3,299,000	5,197,000	2,749,000	4,331,000
Idaho	1,394,000	3,080,000	1,162,000	2,567,000
Wyoming ...	927,000	1,566,000	773,000	1,305,000
Colorado ...	1,010,000	2,036,000	842,000	1,697,000
New Mexico.	192,000	527,000	160,000	439,000
Arizona	1,071,000	2,038,000	893,000	1,698,000
Utah	892,000	1,581,000	743,000	1,318,000
Nevada	206,000	331,000	172,000	276,000
Washington	5,918,000	10,376,000	4,932,000	8,647,000
Oregon	3,777,000	7,935,000	3,148,000	6,613,000
California ..	4,109,000	9,382,000	3,424,000	7,818,000
Summary:				
North Atlantic States	2,670,000	4,910,000	[1]2,225,000	[1]4,092,000
South Atlantic States	2,813,000	5,107,000	[1]2,344,000	[1]4,256,000
North Central States	2,079,000	4,270,000	[1]1,733,000	[1]3,558,000
South Central States	1,726,000	3,342,000	[1]1,438,000	[1]2,785,000
West'n States.	22,795,000	44,049,000	[1]18,996,000	[1]36,707,000

[1]Computed by deducting one-sixth from the figures showing potential horsepower on the basis of 90 per cent efficiency.

The developed water power in these states, including only developments of 1000 h.p. and over are shown in the following table:

Table 7—Developed water power in the United States of concerns having 1000 h.p. or over (including undeveloped power), by states:

	Developed and under construction.		Owned by Commercial Companies but Undeveloped.
	Commercial.	Manufacturing.	
Western States:			
Montana	139,260	.....	195,700
Idaho	52,100	.....	42,300
Colorado	69,690	.....	59,000
Arizona	16,200	.....	.....
Utah	52,700	.....	2,600
Nevada	14,200	.....	24,000
Washington	300,510	.....	115,700
Oregon	95,777	.....	142,600
California	429,467	6,000	732,749
Other States, not enumerated[1]	4,317	7,780	2,000
Summary:			
North Atlantic States	819,045	696,947	382,815
South Atlantic States.....	388,877	107,627	489,410
North Central States.....	511,406	225,774	534,792
South Central States.....	68,000	10,450	3,862
Western States 1,169,904		6,000	1,225,649
Other States, not enumerated[1]	4,317	7,780	2,000

NOTES FROM THE A. I. E. E. INCLUDING RESOLUTION ON SAN FRANCISCO, 1915.

The directors of the American Institute of Electrical Engineers held a meeting on June 27, 1912, at Hotel Somerset in Boston, where important matters of the Institute were brought up for action.

Upon recommendation of the Law Committee, the by-laws relating to the transfer of present associates and members under the special section of the constitution as adopted on May 21, 1912, were modified to eliminate the requirement that the names of applicants and their certifiers be published prior to their transfer; the provision of publication, however, after transfer, being retained.

WHEREAS, The Memorial of the Conferees on a General Engineering Congress prepared at the conference in San Francisco on January 15, 1912, has been before the Board of Directors of the American Institute of Electrical Engineers, together with the report of Mr. Calvert Townley, dated June 10, communicating the result of an informal conference on the same subject between representatives of the national engineering societies in New York, it was

Resolved, On recommendation of the Committee on Organization of the International Electrical Congress, San Francisco, 1915, that the following resolutions be adopted and transmitted to Professor W. F. Durand, president, and Mr. Otto Von Geldern, secretary, of the San Francisco Conference of January 15 on the General Engineering Conference.

WHEREAS, The next International Electrical Congress having been awarded in September, 1911, to the United States by the International Electro-technical Commission and by the International Electrical Congress of Turin upon the request of the American Institute of Electrical Engineers with the understanding that it should be held in San Francisco in September. 1915, the American Institute of Electrical Engineers is under obligations to carry out the plans for holding such a congress along the lines originally laid down by the commission, and is therefore unable to merge this congress with the General Engineering Congress proposed later in the year by representatives of various national engineering societies in San Francisco. The American Institute of Electrical Engineers reiterates the position taken by its board of directors on January 12, 1912, at which time it appointed delegates to the General Engineering Congress Conference, Messrs. H. A. Lardner, George R. Murphy, and S. J. Lisberger, and instructed them to inform the Conference that while being unable to merge the electrical with the general congress, it would be glad, so far as might be compatible with its obligations to the electrical congress, cordially to co-operate in the organization and conduct of the General Engineering Congress and to participate in its program. It was therefore

Resolved, That in response to the Memorial of the Conference on the General Engineering Congress, the American Institute of Electrical Engineers stands ready to concur in and to co-operate with whatever form the movement of the other societies may take, insofar as this co-operation is possible and consistent with its obligations already referred to in connection with the International Electrical Congress of San Francisco, 1915. To this end, although it is not feasible in view of the large financial and other responsibilities undertaken by the American Institute of Electrical Engineers in connection with the Electrical Congress and the accompanying meeting of the International Electro-technical Commission to participate to the extent suggested by the conference of June 10 of representatives of the national engineering societies in New York, which assigned to the American Institute of Electrical Engineers a participation equal to that of the American Society of Civil Engineers and amounting to a guarantee of $9000, with the privilege of having six representatives on the Joint Board of Control of the Congress, the American Institute of Electrical Engineers, nevertheless, hereby is glad to undertake, upon notification of the co-operation of the other societies in question, to guarantee an amount up to $3500, of the deficit or expense that the General Engineering Congress may incur, and to ask in view of this reduced participation the privilege of having but two instead of six representatives upon the governing board of the General Engineering Congress.

The twenty-ninth annual convention of the A. I. E. E. in Boston having been unusually successful, its program containing sixty papers, with particularly liberal entertainment features for members and ladies, and attracting a registration of 936, the board of directors passed most cordial and appreciative resolutions of thanks to Mr. Charles L. Edgar, convention chairman, and Messrs. Charles H. Davis, Louis D. Gibbs, W. H. Blood, and Frederick P. Valentine, chairman of sub-committees, and to the various institutions and corporations who had extended hospitalities to members during their visit. These resolutions were ratified by acclaim at the annual banquet and at the meetings of the various sessions of the convention on the following day.

A MODEL RELIEF ASSOCIATION.

A kindly and parental guidance over its employees by the executives of the modern public utility corporation has done much to heighten efficiency and loyalty among the rank and file. The executives of the Western States Gas & Electric Company, a Byllesby subsidiary having its main office in Stockton, have recently devised a relief association for the employees of their company. This plan, which has already been put into operation, seems to have so many good points in its favor, we publish the Constitution and By-Laws in full in order that other companies may have a model from which to build similar institutions:

CONSTITUTION.

ARTICLE I.

This Association shall be known as the Byllesby Relief Association.

ARTICLE II.

This Association shall be composed exclusively of such of the officers and employes of the Western States Gas and Electric Co., its allied and subsidiary companies, as may unite with it; and the membership of each herein shall cease with the date at which the connection of such member of the Association with said company, or companies terminates.

ARTICLE III.

Its objects shall be to provide for its members while they are disabled by reason of sickness or of injuries received since said member became a member of this Association, and at their death for their families; Provided, That said sickness or death was not caused by intemperance, suicide or immoral or disorderly conduct.

ARTICLE IV.

Such provisions shall include: (1) Payment to each contributor the sum of $7.00 per week while totally unable to labor, and $1.00 per day thereafter; but after six months' disability this payment shall be reduced one half, and after one year shall cease; Provided, That no member shall draw more than $200.00 in one year on account of sickness or disability. (2) In the event of the death of a member there shall be paid to the person designated by him in the application for membership to receive the same, or if there be no such person, then to his legal representatives the sum of $100.00. (3) In the event of the death of the wife of the member there shall be paid to said member the sum of $50.00. In the event of the death of the mother of a single man, there shall be paid to said member the sum of $50.00; Provided, That on account of the death of a mother but $50.00 be paid in one family, and Provided further, That in no event shall more than one benefit be paid to one family for the death of a wife or mother within a period of two years. A member may, however, waive one of said benefits in favor of the other. Provided further, That upon the certificate of the Medical Examiner, made at time of application for membership by employe, to the effect that the wife or mother is not in satisfactory physical condition the Association shall be exempt from payment of any death benefits on account of either to such husband or son.

ARTICLE V.

Members leaving the service of the company or who shall withdraw from the Association shall be entitled to receive from the Treasurer thereof the full amount of the contributions paid by them, less their pro rata share of the disbursements made in accordance with the provisions of the Constitution, during their term of membership.

ARTICLE VI.

The affairs of the Association shall be managed by a Board consisting of eight employes of said company or its subsidiary or allied companies; and such Board of Managers of eight members shall hold office for one year and until others are duly elected and qualified to take their place as managers.

ARTICLE VII.

Election for Managers shall take place the last Friday in September of every year. At these elections for Managers each member shall be entitled to vote, in person or by proxy.

ARTICLE VIII.

No persons shall be entitled to receive any compensation or salary by reason of his service upon the Board of Managers; but each Manager shall be paid for any trips or time he may lose by his attendance at these meetings by the Association.

ARTICLE IX.

The Board of Managers shall make a semi-annual report in writing of its doings to the Association at its regular meeting in September and March.

ARTICLE X.

The moneys and securities belonging to this Association shall be intrusted to the official custody of the Auditor of the several companies whose employes comprise this Association, to be held subject to the requisition of the Board of Managers. Moneys not needed for the current expenses of the Association may be invested by the Board of Managers in United States bonds or other first-class securities.

ARTICLE XI.

The Managers will elect a Secretary from the members, who will perform the usual duties or as may be assigned by the Board of Managers, and who will act as Librarian of all books that may come into possession of the Association and shall receive as compensation for such services an amount which shall in no case exceed the regular monthly dues.

ARTICLE XII.

In settling accounts with members who shall withdraw from or cease to belong to the Association computation shall be made with reference to the first day of the month in which settlement takes place and shall not include fractional parts of the month.

ARTICLE XIII.

Should any difference arise between claimants for benefits herein set forth and the Board of Managers the difference shall be submitted to three arbitrators who are members of the Association, one to be chosen by each party and the third by the two others. The decision of the arbitrators shall be final.

ARTICLE XIV.

All contributions due by members of this Association shall be paid in advance by being deducted from the wages, or salaries, due to them by the Company; and any person who becomes a member of the Association hereby assents to such deduction, and the Treasurer of this Association is authorized to receive the same.

ARTICLE XV.

Payment shall not be made in cases of disability of less than seven days' durations, and then only when evidence satisfactory to the Board of Managers has been received that sickness or injury has caused total disability for labor for the time specified in the claimant's application. A certificate of a physician of the Association shall in all cases be furnished, unless the majority of the Board of Managers shall be satisfied by other evidence of the justice of the claim.

ARTICLE XVI.

The Manager shall from time to time provide for the visitation of the members on the allowance list, and no member refusing to submit to an examination by such visitor shall be entitled to receive any benefit from the fund during the continuance of such refusal.

ARTICLE XVII.

All liabilities on account of death shall be payable within thirty days after receipt of notice of death.

ARTICLE XVIII.

For the several benefits herein set forth each member shall pay $1.00 for entrance and $1.00 as dues per month thereafter; Provided, That when the total amount of active funds to the credit of the Association shall be less than is actually needed, the Board of Managers are authorized to levy and collect, in the same manner as other dues, such a pro rata assessment as the Board of Managers may deem necessary; Provided further, That such assessment shall not exceed fifty cents per month from each member.

Any person eligible to membership in the Association who does not become a member within six months from date of eligibility shall pay an initiation fee of $3.00.

ARTICLE XIX.

All moneys received by the Association other than the contribution of the members, or moneys made by entertainments, shall be kept in reserve (unless needed to pay benefits provided for herein) as a surplus fund, and the interest derived therefrom shall be credited to each individual account on the 1st days of September and March in each year; Provided, That NO account of less than three months' standing shall receive any interest therefrom.

ARTICLE XX.

No employe not in good physicial health or under 18 years or over 60 years of age shall be eligible for membership in this Association; when any member shall reach the age of 60 years dues and sick benefits shall cease, but death benefits will be paid to his legal representative, provided such member is still an employe.

ARTICLE XXI.

Any person who is now or may hereafter be employed by this company or its constituent companies noted above who may have an injury to body or limb may become a member of this Association and shall be entitled to all benefits through sickness or death; Provided, such sickness or death was not caused by said previous injury.

ARTICLE XXII.

Any member who may become injured in any way while at work for the company and who is drawing his regular wages from the said company shall not be entitled to any benefits from the Association while drawing such regular wages.

ARTICLE XXIII.

This Association may be dissolved at any time by a vote of three-fourths of all the members and in the event of such dissolution, all surplus funds on hand belonging to the Association shall be distributed pro rata according to the length of time a member has belonged.

The company guarantees the safe custody and proper disposition of all moneys or securities belonging to the Association entrusted to the care of its Auditor as provided in the Constitution, Article 10.

ARTICLE XXIV.

None of the provisions of this Constitution shall be altered, modified or repealed, nor shall any new rule be made, except at a general meeting of the Board of Managers. Thirty days' notice must be given in writing of any proposed change or modification.

BY-LAWS.

1. The annual election of the Board of Managers shall be held each year at the place and during the hours fixed by the Board of Managers; and the members of the Association shall be notified of such election by the Secretary's posting seven days previous notice thereof. The election shall be by ballot, and the Board of Managers shall appoint necessary inspectors, not members of the Board, to conduct the same and certify the result thereof.

2. The members shall organize at the next regular meeting day after their election, by electing a President and Vice President by ballot ;and in like manner shall also elect a Secretary, who shall be a member of the Association but who need not be one of the Managers. The Board shall engage a physician, or physicians, whose charges for medical and surgical services shall be paid by the Association.

3. The President shall appoint a Finance Committee, consisting of three members of the Board of Managers; and also a relief committee, consisting of not less than three nor more than five members of the Association.

4. The President shall also appoint a Committee on Membership, to consist of three members, whose duty shall be to pass upon all applications for membership, its recommendations to be made to the Board of Managers for action at every monthly meeting.

5. All officers, except the Treasurer and Managers, may be removed at any time by a vote of a majority of the Managers; otherwise they hold their respective offices for one year and until their successors are elected and qualified.

Any manager may be removed at any time by a vote of two-thirds of the members of the Association. Two weeks' notice of such proposed action shall be given and ballots cast in like manner as provided for election of Managers in Section 1 of the By-Laws.

6. Stated meeetings of the Board of Managers will be held on the third Friday of each month and special meetings may be called at any time by the President, and he shall call such meetings whenever requested to do so in writing, by any five members of the Board of Managers. Whenever the day for any meeting falls on a public holiday said meeting shall be held on the following Monday.

DUTIES OF OFFICERS.

7. Subject to the Constitution and By-Laws, and such orders as the Board of Managers may from time to time make, the President shall have the chief management and direction of the affairs of the Association and shall sign checks on the Treasurer therefor.

8. The Vice-President shall be vested with all of the powers, and required to perform all of the duties of the President, during the latter's absence.

9. The Secretary shall keep the books and minutes of the Association.

10. The Treasurer shall draw checks for payments of all bills and expenditures.

11. The Finance Committee shall audit all accounts annually, and shall certify the same to the Board of Managers.

12. No member of the Association shall, without the assent of the Board of Managers, assign or transfer to any person other than that named in his application, any benefits due or to become due to him by the Association; and by any such attempted assign, without such consent, shall be a forfeiture of all claims of the beneficiary to such benefit, unless the Board of Managers shall otherwise determine.

13. Each and every vacancy occurring in the Board of Managers shall be filled by the remaining Managers and the person selected to fill such vacancy shall serve for the unexpired term of the Manager whom he succeeded.

14. Members will not be entitled to the sick or death benefit until they have been members and paid dues for four months. All members will, however, be entitled to medical attention from the date of acceptance of their application.

15. It shall be the duty of every member detained from work on account of disability to immediately inform the Secretary of the Association.

16. The Association is bound to the payment of allowances only when the disability is thus reported, and no claim that has not been so reported will be considered.

17. Any member of the Association who is sick and wishes to leave the city must first obtain the consent of the Association's physician, otherwise he will not be entitled to benefits.

18. Every member leaving the service of the company must

surrender his certificate of membership (which will be his last month's card, and also his copy of the Constitution, or twenty-five cents will be deducted therefor) to the Treasurer of the Association before any settlement of his account will be made.

19. The Treasurer will take a receipt from any member leaving the Association showing that said member has received the return of all contributions less his pro rata share of disbursements.

20. The Board of Managers reserves to itself the power of approving or declining any application for membership.

21. All applications for membership shall be in the hands of the Membership Committee three days before the regular monthly meetings of the Board of Managers.

22. Five member of the Board of Managers shall constitute a quorum for the transaction of all business not otherwise specified.

23. The order of business shall be as follows:

1. Calling of roll.
2. The reading of the minutes of preceding meeting.
3. Communication and reports from the President.
4. Reports of other officers.
5. Reports of standing committees.
6. Miscellaneous business.

But at special meetings the business for which the meetings was called shall have preference immediately after the reading of the minutes.

24. Any one or more of these By-Laws may be altered, amended, added to or repealed by a majority of the Board of Managers after thirty' days notice in writing.

INTERNATIONAL ELECTRICAL CONGRESS.

At a meeting held in Boston on June 25 of the society representative members and of the committee on organization of the 1915 International Electrical Congress of San Francisco arrangements were completed for organizing the congress so as to assist and not conflict with the National General Engineering Congress that will be held in San Francisco in 1915. The International Electrical Congress has already been authorized by the International Electrotechnical Commission, which has recognized jurisdiction in such matters. It will be attended by representatives from electrical engineering societies and the governments of countries throughout the whole world. The committees thus far appointed have been selected by the American Institute of Electrical Engineers to obtain the proper co-operation with the American societies to insure the success of the congress. Both American and foreign societies will soon be requested to appoint delegates of their own selection to represent them in the congress itself. The preliminary details are being arranged by the executive committee, consisting of Dr. C. P. Steinmetz, president; Dr. A. E. Kennelly, C. O. Mailloux, W. D. Weaver and H. A. Lardner, vice-presidents; Dr. E. B. Rosa, secretary; P. S. Millar, treasurer and business manager.

NEW FOREST READJUSTMENTS.

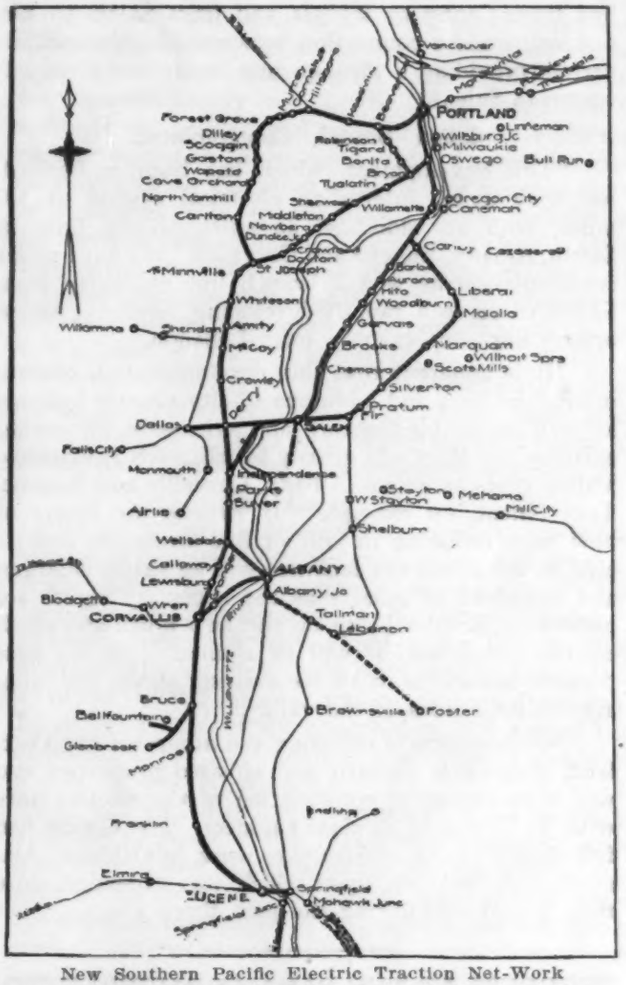
President Taft has just made considerable changes in national forests in Montana, Arizona, Nevada, Utah, and California through presidential proclamations modifying the boundary lines. By these changes nearly 275,000 acres of land are eliminated from the forests, about 65,000 acres are added, and about 55,000 acres are transferred between two forests, while a new forest is created by the division of an old unit into two.

GIGANTIC ELECTRIFICATION OUT OF PORTLAND.

In the illustration shown herewith the heavy lines are electric roads authorized for immediate construction, light lines are existing Southern Pacific steam roads and the dotted lines are projected electric roads. Such is the gigantic network of electrification now under way by the Harriman lines in and about Portland, Ore.

Mr. Calvin of the Southern Pacific Company is quoted recently as saying:

"The O.-W. R. & N. Co. already had made a start upon electrical development in the Willamette Valley by arranging to change the West Side lines to McMinnville and when we took over the property last



New Southern Pacific Electric Traction Net-Work at Portland.

fall it was at once determined by President Sproule to enlarge the plan to take in practically the entire valley. We, therefore, had our agents acquire for the Southern Pacific Company the Portland, Eugene & Eastern Railway and, through it, the Corvallis and Alsea Railroad, which is under construction south to Eugene, and the street car system in Salem formerly owned by the Portland Railway, Light & Power Company.

Material on Ground.

"The work of converting lines between Portland and McMinnville to electric operation is well along

and all of the material needed is upon the ground. We will proceed at once with the electrification of the West Side line from McMinnville to Corvallis and of the Corvallis & Alsea from Corvallis to Eugene, with a short-line cutoff between Wellsdale and Albany; will electrify the Salem, Falls City & Western, which we own, from Dallas to Salem, crossing the Willamette River upon the new Salem, Falls City & Western bridge, which is now under construction. There will be a cutoff in this line from a point about half way between Salem and Derry to Independence.

"We are now acquiring right of way for a double-track line, with room for four tracks eventually, between Oswego and Aurora, from which latter point an electric line will be built parallel to our present steam line to Salem. We also have under construction a line from Canby to Mollala and from Salem to Fir, and will build a connection between Mollala and Silverton, providing a through line from Canby via Silverton to Salem.

Salem Branch Contemplated.

"This development, which has been authorized, will give us an interurban electrical system of 340 miles, with an additional 35 miles of city lines in Salem, Albany, Eugene and Corvallis. We have under contemplation as well a branch line southerly from Salem to serve a rapidly-developing territory, and a branch line southeasterly from Lebanon.

"It is apparent that this development of electric interurban lines and additions to city electric systems as well as double-tracking and otherwise improving existing city lines will greatly benefit such Willamette Valley cities as Salem, Albany, Corvallis and Eugene. Take Salem, for example: It will be the center of new lines radiating in four or five directions and its electric street railway facilities will be vastly enlarged and improved as quickly as the necessary rights are obtained. Besides being on the new north-and south electric trunk line, it will be connected in the best possible manner with all the existing steam line mileage on both sides of the valley."

Mr. Strahorn is directing the affairs of the Portland, Eugene & Eastern and affliated properties and will have charge of construction of the electric lines with R. T. Guppy as chief engineer. Mr. Guppy had full charge of the construction work in Oakland, Alameda and Berkeley, upon which was expended more than $11,000,000 during the past three years.

PROGRESS AT THE PANAMA-PACIFIC EXPOSITION GROUNDS.

Thus far Oregon, Nevada, Washington, Montana, Idaho, Utah, South Dakota, Philippine Islands, Missouri, Hawaii, Nebraska, Kentucky and Illinois have selected sites for their States' participation in the 1915 Universal Exposition. On July 5th, Pennsylvania and Arizona were added to this list. Twenty-nine States have appointed Commissioners to come here and select sites. Compared with other expositions, this showing is considered remarkable. Japan will be the first foreign country to select its site the latter part of July. Canada's representative is also authorized to select a site for that country's participation.

DEFINITIONS GIVEN BY RATE RESEARCH COMMITTEE.

1—Flat Rate—The term **Flat Rate** is applicable to any method of charge for (gas or) electric service which is based on the consumer's installation of energy-consuming devices or on a fixed sum per consumer, irrespective of the quantity used. Meters are not used.

2—Demand Rate—The term **Demand Rate** is applicable to any method of charge for (gas or) electric service which is based on the maximum demand during a given period of time. The demand is expressed in such units as kilowatt or horsepower (or rate of flow of gas). Maximum-demand indicators or graphic meters are used.

3—Meter Rate—The term **Meter Rate** is applicable to any method of charge for (gas or) electric service which is based on the amount used. This amount is expressed in such units as kilowatt-hours of electricity (or cubic feet of gas). Integrating meters or graphic meters are used.

4—Consumer's Output Rate—The term **Consumer's Output Rate** is applicable to any method of charge for (gas or) electricity service based on the consumer's output. The unit of the consumer's output may, for example, be a gallon of water pumped, a barrel of flour, or a ton of ice made, etc.

5—Two-Charge Rate—The term **Two-Charge Rate** is applicable to any method of charge for (gas or) electric service in which the price per unit of metered (gas or) electric energy for each bill period is based upon both the actual or assumed quantity of (gas or) electric energy consumed and the actual or assumed capacity or demand of the installation. (Example—The Hopkins Rate.)

6—Three-Charge Rate—The term **Three-Charge Rate** is applicable to any method of charge for (gas or) electric service in which the charge made to the consumer for each bill period consists of (a) a sum based on the quantity of (gas or) electric energy consumed, (b) a sum based upon the actual or assumed capacity or demand of the installation, (c) a charge per consumer. (Example—The Doherty Rate.)

7—Straight Line—The term **Straight Line** as used in connection with and as applied to any method of charge indicates that the price charged per unit is constant, i.e., does not vary on account of any increased or decreased number of units. The total sum to be charged is obtained by multiplying the total number of units by the price per unit.

8—Block—The term **Block** as used in connection with and as applied to any method of charge indicates that a certain specified price per unit charged for all or any part of a block of such units and reduced prices per unit are charged for all or any part of succeeding blocks of the same or a different number of such units, each such reduced price per unit applying only to a particular block or portion thereof. The total sum to be charged is obtained by multiplying the number of units in the first block by the price per unit for that block and adding thereto the number of units in the second block times the price per unit for that block, and so on until the sum of the units falling within the different blocks equals the number of units to be charged for.

WESTERN LAWS OF ELECTRICITY AND WATER

THE DESERT LAND ACT AND THE CAREY ACT.

BY. A. E. CHANDLER.

The Desert Land Act.

When the arid public lands were first occupied and irrigated there was no act providing for their alienation other than the homestead and pre-emption acts, both passed in 1862. The first act to specially provide for the conditions of the irrigation states was the desert land act of March 3, 1877, which, slightly amended, is still in force. The only public land and irrigation states in which the act is not operative are Kansas and Nebraska.

Only desert lands are subject to entry and it has been held that the following lands are not desert: Lands which produce native grasses sufficient to make an ordinary crop of hay in usual seasons; lands which will, without irrigation, produce a reasonably remunerative crop of any kind; lands bearing a natural growth of trees.

As entry may be made by any citizen, twenty-one years of age, a woman, married or single, is entitled to do so. Under the original act, one section, or 640 acres, was the limit of entry, but by the act of March 3, 1891, it was restricted to 320 acres.

To make entry an application must be filed at the local land office, showing that applicant is a citizen, or has declared his intention to become such; that he is 21 years of age or over; that he is a bona fide resident of the State in which the land lies; that he has not previously made desert land entry or taken an assignment of such; that he has not since August 30, 1890, acquired title to nor is claiming under any of the agricultural lands laws, including the lands applied for, lands which in the aggregate exceed 320 acres; and that he intends to reclaim the lands described in the application through irrigation within four years.

The act of March 3, 1891, provided for the assignment of the entire entry, but the act of March 28, 1908, allows an assignment in whole or in part—except that not less than a 40-acre subdivision can be assigned. The latter act forbids the assignment of an entry to a corporation or an association.

With the application a map must be filed showing the proposed method of irrigating the land described, and a payment of 25 cents per acre must be made. Before the end of each of the first three years after entry proof must be filed at the local land office showing the expenditure of one dollar per acre during the year. This "annual proof" must be sworn to and must be corroborated by the affidavits of two reputable witnesses. Expenditures for ditches, dams, fences, roads, the first breaking of the soil, barns and other stock buildings, and wells for irrigation purposes, will be allowed. Expenditures for stock in an irrigation company to furnish water to land entered will also be allowed.

The entryman, or his assignee, is allowed four years from date of entry to satisfy the requirements of the act, but he may make final proof and receive patent as soon as he has expended three dollars per acre, has reclaimed all the irrigable land included in his entry, and has cultivated one-eighth of the entire area entered. When possible under the state laws, the final proof must show an absolute water right for the irrigation of the land entered. Up to six years ago the Department was very lax in passing upon final proofs, but under the present regulations a rigid examination is made of the water right and the extent of irrigation and cultivation. At the time of making final proof a payment of one dollar per acre must be made.

As there is no residence requirement in the desert land act other than to reside in the state and as payment for the land itself is only $1.25 per acre, the act has been very popular. In the past many irrigation companies secured large areas of public land by stipulating with entrymen to furnish water right and take in return one-half or more of the land entered. Such contracts were illegal and under the present vigilance are not tolerated. It is allowable, however, in contracting with an irrigation company for a water right for a desert entry to stipulate that on default of the specified cash payment the entryman shall deed to the company a portion, or all, of the land entered. It is evident that the permissible contract may result in the same end as the prohibited contract, but, on its face at least, it is not an agreement to convey.

In the few states, like California, which have not accepted the provisions of the Carey act, the desert land act is the best method of securing the settlement of public lands under a private irrigation project.

The Carey Act.

In the last article reference was made to the many failures of private irrigation companies organized to irrigate public land—the principal cause for which being the inability of the company to restrain "sooners" or mere speculators from entering the land, and to secure a sufficient lien, upon such land as subscribed for water rights, for nonpayment of annual charges. To relieve this situation Congress in 1894 passed the so-called "Carey Act"—named after Senator Carey of Wyoming, who introduced it.

The act authorized the Secretary of the Interior, with the approval of the President, to contract with each state having desert lands for the free grant to the state of not exceeding one million acres of such lands "as the state may cause to be irrigated, reclaimed, occupied, and not less than twenty acres of each one hundred and sixty-acre tract cultivated by actual settlers, within ten years after the passage of this act." Before any segregation of land was allowed, the state had to file a map of the land and the plan proposed for its irrigation. As satisfactory proof, according to the regulations of the Secretary of the Interior, was made by the state "that any of said lands are irrigated, reclaimed, and occupied by actual settlers, patents shall be issued to the state or its assigns for said lands so reclaimed and settled: Provided, That said states shall not sell or dispose of more than one hundred and sixty acres of said lands to any one person."

The original act was a great step in advance in that it allowed the segregation of all the public lands under an irrigation project and thus precluded the

earlier type of speculator, but it failed to provide for a lien in case of nonpayment of water right charges. The act of June 11, 1896, met this need by authorizing liens to be created by the state for the actual cost of reclamation and reasonable interest, and by providing that patents shall issue to the state, without regard to settlement or cultivation, as soon as a proper irrigation system and ample water supply are furnished. It is specifically provided in this amendatory act that the United States shall in no way be liable for such lien, or any part thereof.

As stated above, the original act provided that the lands segregated must be reclaimed as specified within ten years after the passage of the act. No change was made in this severe requirement until the act of March 3, 1901, which provided that the ten years' period "shall begin to run from the date of approval by the Secretary of the Interior of the State's application for the segregation of such lands." It further authorizes the Secretary of the Interior in his discretion to grant an extension not exceeding five years.

The original act applied only to states. The act of February 18, 1909, extended the provisions of the act to the territories of Arizona and New Mexico. The act of March 15, 1910, authorized the Secretary of the Interior to temporarily withdraw from entry areas embracing lands for which a state proposes to make application, pending the investigation and survey preliminary to the filing of the regular application for the segregation.

The Secretary of the Interior has prepared regulations which must be followed by the states in making Carey act segregations. No segregation is now approved until examined on the ground and reported favorably by a government engineer. This course has been criticized by some as reflecting upon the states, but as the government is the owner of the land it should not be asked to grant such until all the conditions precedent thereto have been fulfilled to the satisfaction of its representatives. The following statement from the annual report of the Commissioner of the General Land Office for 1911 is in point:

> The importance of this (the examination of projects) can not be overstated, for not only will the lands remain segregated for a long period of time, if the order therefor is once made, but in making such segregation the department is practically committed to the feasibility of the proposition submitted by the state, and people thereafter dealing with the state are in a great degree entitled to regard the proposition of the state as having received the endorsement of the department.

The provisions of the Carey act have been accepted by Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, South Dakota, Utah, Washington and Wyoming. During the fiscal year ending June 30th, 1911, 3,193,314 acres were segregated to the states. The total area patented under the act up to June 30, 1911, is 388,404 acres. The present activity in such projects is shown by the following statement by the Commissioner of the General Land Office (Annual Report, 1911):

> A conservative estimate would indicate that there will be 4,000,000 acres included in segregation lists for Carey act projects during the coming year (1911-1912). During the last fiscal year 1,650,000 acres of selections were examined. There have been withdrawn for exploration and survey under the act of March 15, 1910, 3,500,000 acres.

State Legislation.

Idaho and Wyoming were especially active in preparing for development under the Carey act. There was close co-operation between the officials of the two states and their original legislation in this regard was practically the same, and, as amended from time to time, has served as a model for the other states.

Under the special state legislation the operation of the Carey act as far as the state is concerned is entrusted to a board. The irrigation project is not constructed by the state, but by an individual, association or company contracting with the state through the board. To initiate the enterprise the contractor files with the board a request for the withdrawal or segregation of the desired tract of desert public land and a proposal to construct the irrigation system, stating the source of water supply, the location and dimensions of the proposed works, the estimated cost of construction, and the price and terms at which perpetual water rights will be sold. The request must be accompanied by a certificate of the state engineer showing that the contractor has made proper application to appropriate the necessary water. A certified check of specified amount must be deposited with the board as a guarantee that the contractor will execute a contract with the state in case the segregation is made.

The state engineer is required to report on the feasibility of the scheme, and if his report be favorable the board applies to the Secretary of the Interior for the segregation of the desired tract. If granted, the board and the contractor execute an agreement which includes complete plans and specifications regarding the execution of the proposed work, and specifies the price, terms, and conditions under which water rights (carrying a proportional part of the system) will be sold to settlers. The contractor must furnish a bond, of amount prescribed by statute or regulation of board, as a guaranty of faithful performance of contract.

As soon as the segregation has been made and work initiated by the contractor on a proper basis, the board must publish notice stating that the lands segregated are open for settlement and the price which must be paid to the state for the land and to the contractor for the water right. Any one intending to settle within the project must first execute a water right contract with the contractor for the tract upon which he intends to file. He then applies to the board for the tract, and if successful secures a certificate of location on payment of one-half the price of the land fixed by the state. He must establish his residence on the tract within six months after water is ready for delivery and must cultivate at least one-sixteenth of the land entered during the first year and at least one-eighth during the second year. He must make final proof within three years and complete his payment to the state. The latter payment is generally only fifty cents—twenty-five cents to be paid on entry and twenty-five cents on final proof. The statutes provide for the control of the system being given to the water users thereunder, but the condition precedent thereto varies greatly. Idaho gives control when 35 per cent of the total lien has been satisfied, while South Dakota leaves the control with the contractor until 90 per cent of the land has been sold. In Oregon the system must be turned over to the settlers within ten years.

Development Under the Carey Act.

The data for the following statistical statement of the work accomplished in the various states under the Carey act was taken from the last biennial reports (1909-1910) of the land or Carey act boards and of the state engineers. It was assembled by Mr. A. P. Stover, of Irrigation Investigations of the United States Department of Agriculture, in his very comprehensive paper entitled "Irrigation Under the Carey Act," published in the Annual Report of the Office of Experiment Stations for the year ending June 30, 1910. The data, with the exception of the area granted, is for the close of 1910.

Colorado.—The total area granted to the state, not including the Ute Indian Reservation grant, is 1,000,000 acres; the total area segregated, contracted and applied for was 1,121,940 acres; the area of reclaimed land sold to settlers was 34,000 acres; the number of projects being developed was 20; and the cost of water rights ranged from $15 to $45 per acre.

Idaho.—The total area granted to the state is 3,000,000 acres (2,000,000 acres having been added by Congress in 1908); the total area segregated was 2,630,833 acres; the area of reclaimed land sold to settlers was 270,184 acres; the number of projects being developed was 42; and the cost of water rights ranged from $20 to $100 per acre, with an average of $28 per acre.

Montana.—The total area granted to the state is 1,000,000 acres ;the total area segregated was 411,326 acres; the area of reclaimed land sold to settlers was 45,000 acres; and the number of projects being developed was 13.

Nevada.—The total area granted to the state is 1,000,000 acres; the total area segregated was 173,215 acres; and the number of projects being developed or investigated was 13.

Oregon.—The total area granted to the state is 1,000,000 acres; the total area segregated was 593,124 acres; the number of projects being developed was 16; and the cost of water rights ranged from $10 to $60 per acre.

Wyoming.—The total area granted to the state is 2,000,000 acres (1,000,000 acres having been added by Congress in 1908); the total area segregated was 1,390,365 acres; the area of reclaimed land sold to settlers was 130,000 acres; the number of projects being developed was 63; and the cost of water rights ranged from $10 to $65 per acre, with an average of $15 per acre.

Practically nothing had been done under the Carey act at the close of 1910 in New Mexico, South Dakota, or Washington. In Utah ten projects were being examined and one had reached the construction stage. Water right charges up to $250 per acre are proposed in Utah. It must be remembered that the maximum water right charge is fixed in the contract with the state, so that the state officials are to blame if excessive charges are allowed. The aim ordinarily is to give the contractor a good profit and at the same time to protect the settler. In Oregon the practice has been to fix the maximum charge at "the actual cost of construction plus seventy-five to one hundred per cent profit, to reimburse him for the risk, cost of selling and other necessary expenses in addition to the usual construction cost."

DEFINITIONS OF SOME IMPORTANT TERMS.

Due to the rapid rise of the electrical industry and the evolution of the art many new words have crept into our language. The various engineering societies are grappling with the problem and gradually the confusion of tongues is subsiding. The National Electric Light Association has adopted the following definitions of important terms:

Capacity Factor—The ratio of the highest experienced load for a specific interval of time to the maximum capacity for this same interval.

Example—A station whose highest average load during one hour has been 8000 kw., and whose maximum capacity for the same interval, one hour, is 10,000 kw., would have a capacity factor of $\frac{8000}{10{,}000} = 80$ per cent

Note—The interval over which load is integrated should be the same as the interval on which maximum capacity is based. This interval may be momentary, or five minutes, or one hour, etc., but should be stated in giving capacity factor. It will be seen that capacity factor cannot be greater than unity, and the difference between the capacity factor and unity is the margin available for growth, spare capacity, or emergency.

Demand—Demand is a load specified, contracted for, or used, expressed in terms of power, as kilowatt or horsepower.

Note—The interval of time considered should be specified.

Diversity Factor—The ratio between the simultaneous demand of a number of individual services for a specified period, such as one hour, and the sum of the individual maximum demands of those services for the same period.

Note—Diversity factor is expressed in per cent, and can never be greater than unity unless expressed in terms of its reciprocal.

Effective Demand—The demand at the time of the system's maximum load.

Note—This can be applied to an individual customer, feeder, or station.

Example—If the maximum demand occurs on an electric system at 5 p. m. December 20th, the effective demand by an individual service would be the demand of that service at the hour mentioned.

Feeder—An electric circuit used to supply power to a subsidiary distributing system.

Instantaneous Value—The value of varying quantity at a particular instant, as distinguished from a value averaged over a finite length of time.

Note—The instantaneous value is the absolute value at any instant as given by oscillograph record.

Indicated Value—The value of a varying quantity as indicated by an instrument which averages the instantaneous values.

Note—Indicated values are given by common ammeters, voltmeters and other electrical instruments, as they average the values of sine wave or fluctuating current, due to their inertia or dead-beat qualities.

Indicated Peak—A peak load as given by an indicating instrument.

PHOTOGRAPHY IN ENGINEERING

BY M. R. LOTT.

Manipulation.

The different processes which are undergone in the production of a finished picture may be stated as follows. These are given in their natural order:

1. Exposure of plate.
2. Development of plate.
3. Fixing plate.
4. Washing plate.
5. Drying plate.
6. Retouching plate.
7. Printing negative.
8. Developing print.
9. Fixing print.
10. Washing print.
11. Drying print.
12. Mounting print.

Normal conditions will be treated first, then abnormal ones with methods for correcting them. Later on the making of bromide enlargements will be discussed, and finally formulas recommended for performing the work will be given, accompanied by brief discussions of their properties.

kind of weather have a great influence on the time length of exposure, the intensity of light under ordinary conditions being much greater at noon than at any other time of the day. The quality of the light varies with the season.

Varying the opening of the diaphragm changes the amount of light entering the camera and consequently affects the length of exposure. There are two systems for indicating the size of opening of the diaphragm. the one most commonly used being the U. S., or uniform system, which gives the following exposures in terms of the exposure for the largest stop as unity:

1, 2, 4, 8, 16, 32, 64, 128, 256.

The smaller the opening used the sharper will be the image, but for ordinary purposes stop 64 gives satisfaction.

A Photograph With Bromide Enlargement at the Right

Dry Plates and Their Exposure.

Briefly stated, a dry plate consists of a film of gelatin containing silver bromide and iodide mounted upon one side of a glass plate.

The operation of loading a plate holder is carried on in the developing room, using only the ruby light previously described for illumination. Care should be taken to see that the plate holder is free from dust before the plate is inserted. The emulsion side of the plate is towards the lens when placed in the camera. This surface should be lightly brushed with a camel's hair brush, about 2 in. wide, after the plate has been placed in the holder, to remove any dust that may be present. If this precaution is not observed, small transparent spots will appear on the negative when it is developed.

There are four main conditions which govern the length of exposure of a plate:

1. The character of the light illuminating the object to be photographed.
2. The opening of the diaphragm.
3. The object to be photographed.
4. The sensitiveness of the plate used.

The altitude of the sun, the time of year, and the

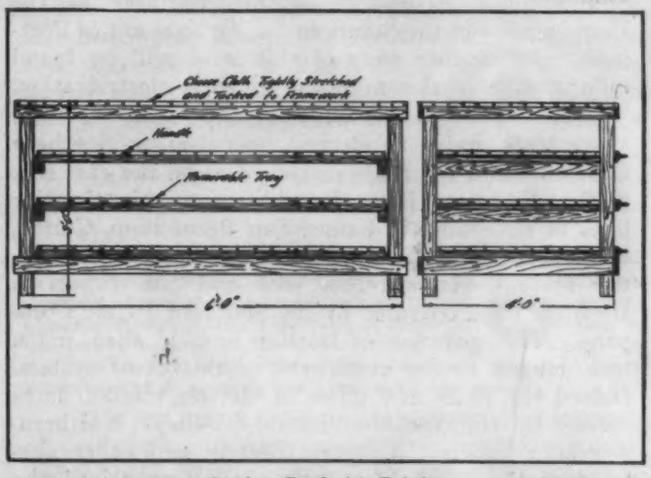
There is usually a great difference in the lengths of exposure required for photographs of drawings taken by reflected light and photographs of tracings taken by transmitted light, the latter requiring much the less time.

Plates are made with different degrees of sensitiveness according to the class of work for which they are intended to be used. For taking photographs of drawings and tracings, Cramer's Contrast plates give excellent results, 10 in. by 12 in. being a convenient size to use, as the prints may then be trimmed down to 8½ in. by 11 in. (letter paper size) for binding with reports, etc.

Experience in judging the actinic qualities of the light is the best means to use for deciding upon the correct exposure to be given a plate, though there are various devices for aiding a person not experienced in the work. Among these may be mentioned Wynne's Infallible Exposure Meter. This device depends upon the time required for its sensitized paper to assume the shade of a standard color. Scales are given which give the time of exposure for different stops and for plates of the various manufacturers.

Exposures of the plate should be accomplished by removing the lens cap.

Dry plates have the quality known as "latitude," this characteristic permitting different lengths of exposure, still preserving the proper gradations of

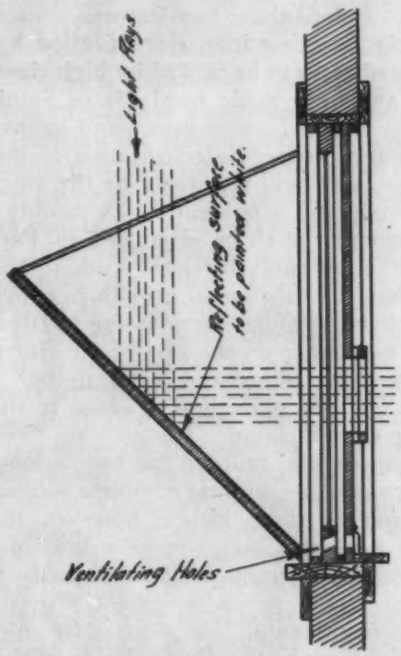


Drying Rack for Prints.

density that is, still possessing the proper exposure. This property varies with different brands of plates.

Development.

The exact effect of the rays of light upon the plate is unknown, but whatever the composition formed may be, the action of the developer is to reduce it to metallic silver. There are numerous agents used for accomplishing this result. A developer must include three agents, one to act as a reducer, one as an accelerator, and one as a preservative.



Device for Reflecting Light from Sky When Horizon Is Obscured.

The reduction to metallic silver means that bromine is set free. The water in the solution furnishes the hydrogen for the necessary reaction. This reaction necessitates the presence of some substance with which the oxygen may combine.

Alkalies, such as sodium or potassium carbonate, accelerate the reduction by increasing the affinity of the developing agent for oxygen. Sulphite of soda also seeks oxygen and its presence in the developer governs the action of the developing agent and prevents its oxidation till development is accomplished.

When a plate is developed, it should be first wet in water before being placed in the solution in order to insure an even flow of developer over its surface. Development should take place with the film side of the plate up and during the process the film should be shielded from the ruby light as much as possible.

The kind of developer to be used depends upon the purpose for which the negative is made. When great contrast transparent high lights and dense shadows is desired, such as is required in photographs of drawings Cramer's X-Ray Developer (formula given later) is unexcelled. For photographs of machinery and engineering structure, where detail is essential, Eastman's Pyro Developer or an adaptation of Eastman's M. Q. Developer (formulas given later) gives excellent results.

Given a correctly exposed plate, the high lights will appear first during development and these will be followed by the half tones, and then by the shadows. The longer the time of development, the greater the strength secured until the strongest high light is visible on the back of the plate. Ordinarily this takes place when a plate has been developed until no image is apparent when held up to the ruby light for the purpose of looking through. When this stage has been reached development should cease.

After a plate has been in the developer a short time it is possible to determine whether the exposure has been correct or not. If a plate has been over-exposed, the image appears simultaneously all over as soon as the action of the developer takes place, while in the case of under-exposure development takes place slowly. Over-exposure tends to destroy contrast but its effects may be greatly remedied by the method of handling. A few drops of a 10 per cent solution of potassium bromide added to the developer as soon as over-exposure is apparent will restrain the action of the developer, thereby giving more time for the details in the shadows to be brought out. Development in this case will last long enough to bring out the detail. If the negative is too dense it may be reduced afterwards by use of the reducing solution discussed later. An under-exposed plate can not be helped much, but if it is not possible for it to be retaken, matters may be remedied a little by removing the plate from the developer and placing, without rinsing, in clear water for a short time and then back to some fresh developer. In case of over-exposure, the amount of developing agent should be increased according to the degree of over-exposure, and for under-exposure more carbonate of soda should be used.

The printing qualities of a thin negative may be improved by the use of the intensifying solution given later. A developer too strong or too warm will tend to produce a chemical fog unless a few drops of potassium bromide are added to the developer.

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POWER AND GAS

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Changes of advertising copy should reach this office ten days in advance of date of issue. New advertisements will be accepted up to noon of Monday dated Saturday of the same week. Where proof is to be returned for approval, Eastern advertisers should mail copy at least thirty days in advance of date of issue.

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FOUNDED 1887 AS THE
PACIFIC LUMBERMAN, CONTRACTOR AND ELECTRICIAN

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Railway Electrification at Portland

As first announced in these columns two weeks ago, R. T. Guppy, who had complete supervision of the construction work of the Southern Pacific's Alameda county electrification, has been placed in full charge as chief engineer in the electrification of the Southern Pacific lines out of Portland. On another page of this issue will be found fuller details of this proposed gigantic electrification.

The Southern Pacific Company now has 900 single-track miles in electric operation in Southern California and 100 miles in the cities on the east side of San Francisco Bay. In addition to this, the city lines in Riverside, Redlands, San Bernardino, Colton, Fresno, Stockton, San Jose and the Peninsular electric system, between San Jose and San Francisco are owned and operated by the Southern Pacific Company. The operation of traction lines is, then, not a new subject to the executives of this great system. Indeed the miles and miles of electric traction lines owned by the Spokane Inland, Vallejo Northern, Northern Electric, Oregon Electric and other systems of the West have long since emphasized the substantial permanency of this mode of conveyance.

It is doubtful if any single thing has been so potent in the development of Southern California for instance as that resulting from the world famous network of interurban and suburban electric lines in that section of the Golden State. A rancher living among the orange groves enjoys all the sweet quiet and wholesome life of the country and yet within an hour's time, if he so desires, he may be whisked into the center of the great southwestern metropolis—Los Angeles. The produce of the farm, too, has become far more directly transported to the centers of consumption. Indeed these two features, now recognized as infallibly resulting from electrification have caused thousands of acres to be settled by high class intensive ranchers and have made rural life in Southern California a by-word of contentment and happy boosting.

With the proposed electrification of the Willamette Valley, such will inevitably be the happy destiny of that productive community. A destiny bright in future promise for those interested in Portland and the future of her rural districts. Nothing builds a city quicker than the substantial growth in population and in productiveness of her surrounding territory.

This new move on the part of the Harriman lines has another interesting and even deeper phase attached to it. One more link is added to the chain of coast long electrification. The problem of electrifying the transcontinental railroad has been a long and seriously discussed one without complete solution to date. In summing up the evidence, however, the greatest argument against it seems to be a host of "doubting Thomases," reared from childhood upon the steam propelled idea. They proclaim opposition until they can see a transcontinental line electrically operated and rest their eyes upon the dividend side of the resulting ledger accounts. Until such time as this nothing may be expected from them.

The West has ever been willing to exploit new ideas and make good. This new move of the Southern Pacific Company merits the heartiest support from all concerned.

Hydroelectric Developments

The recent N. E. L. A. convention at Seattle did much for the West. No small credit for the superb boosting of western enterprise and progress is due to the beautiful special issues of the great eastern electrical journals brought forth and distributed among the hundreds of delegates to this convention. The Electrical World of this particular issue, for instance, resembled in size and expert material an unabridged encyclopedia of western hydroelectric projects.

In the editorial of the issue referred to, however, entitled "Hydroelectric Developments," appeared the following:

"It is remarkable that already the water power utilized in the Western States of California, Colorado, Idaho, Montana, Oregon and Washington is collectively nearly half of the total power available in the waterfalls of those States, according to the recent reports of the Commissioner of Corporations. In the Eastern States the water power already harnessed bears a much smaller ratio to the total available power."

This statement appearing in the editorial columns of such high authority caused considerable comment and surprise at the convention among hydro-electric men who are familiar with the enormous potentialities of undeveloped water power in the west. On another page of this Journal will be found a summary of the water powers of the United States taken from the commissioners' report referred to. Below is the actual report in figures of the states referred to:

	Undeveloped Min.	Undeveloped Max.	Developed or under construction.	Undeveloped but owned by companies now actually generating hydro-electric power.
California ..	3,424,000	7,818,000	435,467	732,749
Colorado ...	842,000	1,697,000	69,690	59,000
Idaho	1,162,000	2,567,000	52,100	42,300
Montana	2,749,000	4,331,000	139,260	105,700
Oregon	3,148,000	6,613,000	95,777	143,600
Washington	4,932,000	8,647,000	300,510	115,700
	16,257,000	31,673,000	1,092,804	1,199,049

Thus, the minimum western water power in these states as given by the commissioner is seen to be 16,257,000 while that actually developed or under construction is given as 1,092,804, which is seen to be not quite 7 per cent of the total—far different from "nearly half." In other words only a beginning has been made. Possibly the writer referred to mistook the column shown above to the right giving the total of 1,199,049 as the total undeveloped horsepower. This is not clear to us, however, at least so far as California is concerned, for under a tabulation on page 1195 of the Electrical World purporting to set forth comparative line data on transmission systems, there is omitted all reference in the tabulation to the Pacific Gas & Electric Company of central California, the greatest hydroelectric net-work in the world. By reference to the commissioner's report, it is seen that the column totaling 1,199,049 horsepower bears positively no relation to the total power resources of these states, for, as shown, it is simply a statement from the power companies now actually generating hydroelectric power as to what water powers they themselves still control though in the undeveloped state. This column for instance makes no attempt at summarizing the powers owned by hundreds of western hydroelectric companies still in the embryo, nor does it total the powers still in possession of the federal states or the federal government. The total minimum column of 16,257,000 h.p. does, however, after boiling down the former report of the U. S. G. S. and allowing for all reasonable factors, give a conservative estimate of undeveloped western water power.

Again, we challenge the statement that in the eastern states the water power already harnessed bears a much smaller ratio to the total available power than in the western states. Let us once more refer to the commissioner's report, taking the most conservative figures there to be found, that under the "minimum" heading.

	Minimum possible power.	Developed or under construction.
North Atlantic States	2,225,000	1,515,992
South Atlantic States.....	2,344,000	496,504
North Central States	1,733,000	737,180
South Central States	1,438,000	78,450
Other than Western	.....	12,097
	7,760,000	2,840,223
Western States 18,996,000		1,175,904

Thus, it is seen that in the western states a total of 1,175,904 horsepower are now developed from a possible minimum of 18,996,000, while in the eastern states 2,840,223 are developed from a possible minimum of 7,760,000. In a word, 36.6 per cent of possible water powers are even now developed in the eastern states as opposed to only 6.2 per cent in the western states.

Some difference!!!

Relief Associations

A feature emblematic of the human sentiment embodied in the present day attitude of the executives of the leading public utility companies is that looking toward the financial protection of employes in times of sickness and in times of death. Indeed, the whole trend in public utility success under the commission regulating regime is toward development of loyalty among the rank and file of those administering the affairs of the public utility, for success is achieved nowadays largely in living up to the commandment of the modern Moses—"The public be pleased." Teamwork, then, seems to be the keynote to success.

The old adage, speaking of the friend in need, never uttered truer saying. The good things of life seem largely composed of emotions brought to consciousness in times of need or human suffering. Such emotions imbue us with loyalty and appreciation seldom brought about under less trying circumstances. The wide-awake public utility company is not asleep or indifferent to this truism. On another page of this issue appears the constitution and by-laws of a relief association recently promoted and put into successful operation by the Western States Gas & Electric Company, which maintains its headquarters at Stockton, California.

The idea merits the profoundest consideration of all public utility corporations. In many cases departures will of necessity have to be made in applying to other companies and conditions the details as set forth in the constitution and by-laws referred to. The main idea—mutual help and benefit—developed along practical lines will do more than anything else, however, in developing true loyalty to public utility interests.

PERSONALS.

Waldema Chirakoff, of Moscow, Russia, is inspecting Pacific Coast irrigation systems.

George J. Henry Jr. has returned to San Francisco after visiting Montana in conection with hydraulic engineering work.

E. B. Walthal, assistant general manager of the San Joaquin Light & Power Corporation, is a recent San Francisco visitor.

C. L. Cory, consulting engineer, left Berkeley on Saturday, together with Mrs. Cory, for an outing in Yosemite Valley.

L. E. Strothman, manager of the pumping engine department of the Allis-Chalmers Company, of Milwaukee, is at San Francisco.

A. E. Griswold of the A. G. Electric & Manufacturing Company, San Francisco, was in Seattle recently looking after the interests of the "A. G." products.

J. B. Lukes, representative of the Stone & Webster Engineering Corporation, has returned to his headquarters at San Francisco after visiting Denver.

M. W. Wuesthoff, Pacific Coast representative of the Glauber Brass Manufacturing Company of Cleveland, Ohio, is among the recent arrivals at San Francisco.

C. Z. Czarnecki, a recent graduate of the electrical engineering department of the University of California, is with the Great Western Power Co. in their Napa division.

Franklin Schwabacher, secretary of the Floriston Pulp & Paper Co., and an associate member of the A. I. E. E., has returned to San Francisco from a trip to Sonora, Mexico.

E. E. Gilbert, manager of the turbine sales department of the General Electric Company, is on his way to Schenectady, via Chicago, after spending several weeks on the Pacific Coast.

O. E. Barlow, the Pacific Northwest district manager for the American Ever-Ready Company, recently visited the company's Factory No. 8 at San Francisco, under the supervision of President R. F. Oakes.

A. E. Chandler, secretary of the American Engineering Corporation of San Francisco, has left for Humboldt, Nevada, where he is retained by the Pacific Reclamation Company as water right expert.

George I. Kinney, manager of the San Francisco office of the Fort Wayne Electric Works, returned during the week from a short vacation trip. He reports good prospects in the electric drill department of the business.

Y. Sakai, for eight years in the engineering staff of the Westinghouse Manufacturing Co. at East Pittsburg, left San Francisco Saturday on the steamer Nippon Maru for Tokyo, Japan, where he expects to open up consulting engineering offices.

A. E. Rowe, sales manager of the Telephone Electric Equipment Company, has just left for an extensive tour of Southern California. He will be at San Jose during the annual convention of the State Electrical Contractors' Association late in July.

Sidney Sprout, supervising engineer for the California-Oregon Power Company, returned to San Francisco during the past week, after visiting the company's dam site on the Klamath River, where work will be pushed as soon as the water is a little lower.

B. S. Josselyn, president of the Portland Railway, Light & Power Company of Portland, Ore., in recognition of his five years' service with the company, was recently presented with a gold stripe arm band, resembling that worn by the company's motormen and conductors.

John A. Britton, general manager of the Pacific Gas & Electric Company, J. H. Wise, his assistant, and George C. Holbertson, San Francisco district manager, made an insepction of the extension work in progress at Lake Spaulding, Placer County, during the past week.

C. H. Holley, general manager of the Tulare County Power Company, and **Fred Hamilton**, superintendent at Visalia for the Mount Whitney Power and Electric Corporation, were at San Francisco during the recent hearing involving the two corporations fefore the Railroad Commission.

John Bray, assistant treasurer of the Western Electric Company, has arrived at San Francisco from New York and is visiting F. B. Gleason, manager of the Pacific Coast department of the company. Mr. Bray won second honors in the mile run at the Olympic games at Paris in 1900.

A. W. Bullard, general manager of the Great Western Power Company, and **P. T. Hanscom**, his general superintendent, have returned to San Francisco after spending several days inspecting the new work in progress at the Las Plumas power station and at the site of the new dam at Big Meadows.

John F. Gilchrist, assistant to the president of the Commonwealth Edison Electric Company of Chicago, is a recent arrival at San Francisco. He is an ex-president of the National Electric Light Association and is the right hand man of Samuel Insull, who is now heavily interested in the Pacific Gas & Electric Company.

R. Leo Van der Naillen, general manager of the Oro Electric Corporation, which has been given permission by the Railway Commission to install a hydroelectric transmission system in Plumas County, will visit the power site during the coming week, with a view to commencing work as soon as conditions will permit.

ELECTRICAL DEVELOPMENT LEAGUE.

The semi-annual business meeting of the Electrical Development League was held at Tait's Cafe in San Francisco at the regular monthly meeting time, Tuesday, July 9, 1912. The affairs of the league were shown to be in excellent condition. W. L. Goodwin, chairman of the membership committee, reported 141 members enrolled with no resignations to date.

The following officers were elected: President, H. B. Carter; vice-president, A. W. Bullard; executive committee, Wynn Meredith, Geo. C. Holberton.

Chas. Gilchrist, recent president of the National Electric Light Association Convention at Seattle, was guest of honor and spoke in the highest complimentary terms of the great part the Electrical Development League had played both in entertaining the delegates to the convention and in the favorable impression created on all sides by sending the Golden Poppy Special to the Seattle Convention.

MEETING NOTICE.

The sixth annual convention of the Illuminating Engineering Society will be held at the Hotel Clifton, Niagara Falls, Ontario, September 16 to 19. The program of papers that is being arranged includes a number of notable papers which embody the results of some recent photic investigations. There will also be a potpourrie on miscellaneous phases of illuminating engineering.

ELECTRICAL JOBBERS' MEETING.

The next meeting of the Electrical Supply Jobbers' Association of the Pacific Coast will be held at Lake Tahoe, August 22, 23 and 24, 1912. The committee will arrange tennis, billiards, bowling and pool matches, besides which there will be fishing, swimming and a steamer trip around the lake. Reservations may be made through A. H. Elliott, 34 Ellis street, San Francisco.

ELECTRICAL CONTRACTORS' NOTES.

W. D. Thomas, an electrical supply dealer and contractor, of Petaluma, has been visiting San Francisco.

M. McConnell, an electrical contractor of Santa Rosa, has been spending a few days at San Francisco.

Arthur Kempson has been appointed assistant chief of the Department of Electricity at a salary of $200 a month, having been promoted from the position of superintendent of outside construction. For the first time a liberal budget has been adopted which will give Chief William J. Nixon enough men and resources to carry on the work of the department as it should be. Electrical contractors will now be able to get their work inspected promptly and avoid delays in securing payment for their work.

LAST CALL FOR EXCURSION TO CALIFORNIA CONTRACTORS' CONVENTION.

BY W. S. HANBRIDGE.

With the returns coming in from our many electrical friends we can assure you that there will be a very large crowd at San Jose during the entire convention.

"Something doing every minute" is our motto.

Don't forget that there are special rates on both the Santa Fe and the Southern Pacific Railroad. When you buy your ticket, get a one-way ticket with a receipt certificate, which, when signed by the secretary, will entitle you to a return ticket for one-third fare.

The going tickets are good up to and including July 27th and will be placed on sale on and after July 15th. The return tickets on sale on and after July 24th and are good up to and including August 1st. Stop-over privileges will be allowed going, but not returning.

The St. James Hotel has been selected at headquarters.

The arrangements for the program have been completed and there will be plenty of fun; good chances to get acquainted with one another, and last but not least, special attention has been paid to the educational program.

Come yourself and bring the family. Come in your every day clothes, so you can have a good time.

A copy of the program has been sent you, but lest you forget, we will repeat:

Wednesday, July 24th, 10:00 a. m.—Business meeting; members only. 1:30 p. m.—Ladies and visitors sight-seeing auto trip to Congress Springs, returning by way of Los Gatos. 8:00 p. m.—Reception, concert, dancing and through the kindness of the Westinghouse and General Electric Company an illustrated lecture will be given.

Thursday, July 25th: 10:00 a. m. and 2:00 p. m.—Business meeting, members only. 11:00 a. m.—Sight-seeing trip to Palo Alto through the foothills, via Interurban Special train. A lunch will be served the visitors by the Chamber of Commerce of Palo Alto. After lunch the ladies and visitors will be given an auto sight-seeing trip through the mountains, while the members will hold a session in the National Guard Armory. In the evening, a theatre party.

Friday, July 26th: 10:00 a. m.—Open meeting for all who attend. Mr. H. V. MacMeans, of the Southwestern Surety Insurance Company, will explain the Rosebury Act and how rates are arrived at for liability insurance. Mr. C. W. Mitchell, inspecting engineer of the Board of Fire Underwriters, will read a paper on the Underwriters' Rules. Mr. Milton Wise, publicity manager of the Great Western Power Company, will read a paper on the Development of the Electrical Business by Advertising. W. S. Hanbridge will talk on "Methods of Estimating and what should be done to protect same."

Recess.

2:00 p. m.—Open meeting. Mr. Tracy Bibbins will read a paper on "How the Manufacturer and Contractor can assist one another in the general uplifting of their business." Mr. Geo. Holberton, of the Pacific Gas & Electric Company, will tell us what we should know about the commercial end of the central station, at the same time showing pictures of their plants. Mr. Charles Hillis, of the Electric Appliance Company, will tell us of the "Wits of the Contracting Business and how to correct same, from the eyes of a Jobber." Last, our old friend Mr. Albert Elliott, will make a final talk on "Co-operation among the electrical trades."

As the above will not interest the ladies, there will be a sight-seeing auto trip to Alum Rock Canyon for them.

In the evening at 8:00 p. m. sharp, we will sit down to the annual dinner. Plenty of entertainers have been provided. Host Bettins has arranged a fine menu. Strictly informal.

The inspectors from the different cities in California; also representatives from Oregon and Washington Electrical Contractors' Association, who will return from Denver National Convention with our delegates, will attend as our guests.

Saturday, July 27, will be Electrical Trades Day. Leaving the St. James Hotel at 9:00 a. m. we will proceed to Luna Park. As soon as a game can be called the Northern and Southern Contractors will lock horns for the baseball championship of the coast.

Good music for dancing will be provided.

A good lunch will also be provided.

After lunch, the following contests will be held:

100-yard dash for men; 50-yard dash for ladies; 100-yard dash for members; 25-yard dash for ladies over 160 lbs.; 50-yard dash for girls under 16 years; 100-yard dash for boys under 16 years; 50-yard dash for children under 7 years; 25-yard dash for babies under 4 years; 50-yard dash for fat men.

Gate prize drawing.

Ball game between Supply men and Contractors, for a cup.

Golf contest—for Electrical Supply men only.

Season tickets for non-members can be obtained from Contractors at $5.00 each.

For the benefit of our friends who can only get away for Electrical Trades Day, tickets will be sold at the park entrance at $1.00 each. Banquet $2.50 each. Sight-seeing trips $1.00 each. Theatre party $1.00 each.

The following are the committees:

Committee of Arrangements—L. R. Boynton, N. Hope, L. G. Ames, L. Levy, W. S. Hanbridge.

Finance Committee—F. Somers, H. Tittle, F. Watts, W. S. Hanbridge.

Reception Committee—C. Faser, F. Somers, R. A. Warner, J. Gilbert.

Ladies' Reception Committee—Mrs. Chas. Faser, Mrs. F. Somers, Mrs. R. A. Warner, Mrs. L. R. Boynton, Mrs. L. G. Ames, Mrs. P. Levy, Mrs. W. S. Hanbridge.

Entertainment of Ladies and Visitors—P. Levy, J. Foster, R. A. Warner, C. Anthony, J. Gilbert.

Annual Dinner Committee—P. Decker, N. Hope, F. Somers.

Picnic Committee—Seth Cohn, L. G. Ames, Chas. Faser.

Prize Committee—L. Levy, L. R. Boynton, H. Reed, C. Eppstein, G. Davis, W. Kohlwey, G. Peters, M. Fortini.

Music and Printing—C. Faser, L. R. Boynton, W. S. Hanbridge.

Transportation and Hotel—W. Kirsten, G. Sitman, W. S. Hanbridge.

Convention Papers—C. F. Butte, P. C. Butte, L. Levy, W. Gallavin.

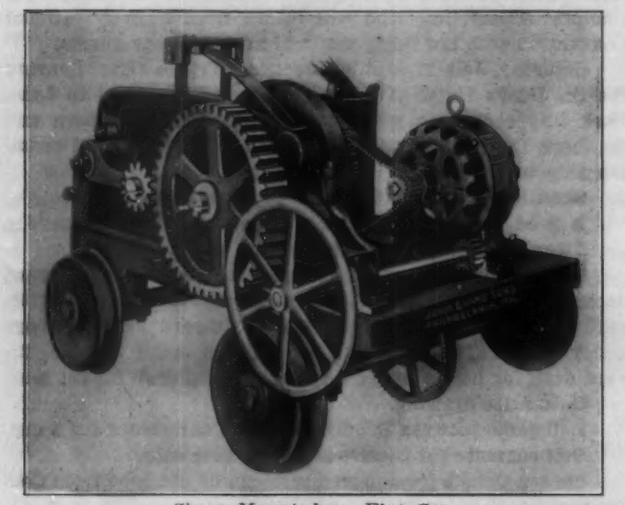
The Electrical Development League at its meeting held Tuesday, July 9th, 1912, passed a resolution and appointed a committee to secure one or more special cars to take their members, who were unable to attend the convention on account of business, to San Jose, leaving San Francisco, Third and Townsend streets, at 9:00 a. m. Saturday morning, July 27th, 1912.

It has been decided to hold a Sons of Jove Rejuvenation on the evening of Saturday, July 27th, and it is expected to be one of the events of the convention.

INDUSTRIAL

A PORTABLE SHEAR, MOTOR OPERATED.

A novel motor application is shown in the accompanying illustration of a John Evans' Sons' shear mounted with its driving motor on a small flat car. The places where this machine may find a use are limited, but it is a very valuable adjunct to wholesale hardware houses, factory storerooms, railroad shops, or in any place where metal bar or strap is handled.



Shear Mounted on Flat Car.

The car is designed for standard gauge track, being propelled by the hand wheel. The car is run along on track, in front of the bins containing the material, to any particular point where the required lengths of the desired material are cut.

The shear motor is of Westinghouse make, 7½ horsepower, operating on three-phase alternating current. The current is conveyed to the motor by means of a long flexible cable, or, when used over a track of any length, a number of junction boxes for making connections to the motor is more satisfactory.

TRADE NOTES.

Pass & Seymour, Inc., of Solway, N. Y., have opened Pacific Coast sales offices in the Rialto Bldg., San Francisco, in charge of W. Brewster Hall, Pacific Coast sales manager.

Charles C. Moore & Company, through their Seattle office, were awarded the contract by the government to furnish a Harrisburg, 4-valve, 120 horsepower engine at Fort Casey. The engine is to be direct connected to generator, for supplying light and power.

The Great Western Power Company's general offices have been removed from the Shreve Building to 227-233 Post street, where an entire six-story building is occupied. The sixth floor, which will be occupied by General Manager Bullard, will be practically one large office, with only a few glass partitions.

The Stimson Mill Company, Seattle, Wash., which recently contracted for a complete electrical power plant equipment, has arranged for motor drive throughout its mills and placed an order with the General Electric Company for thirty-three motors ranging from 5 to 300 h.p. with necessary controlling apparatus.

The Coast Range Lumber Company, Mabel, Ore., will soon install equipment for electric motor drive consisting of four motors of 10 h.p., two of 35 h.p., one of 25 h.p. and two of 50 h.p.; also a 75 kw. turbo generator and switchboard. The order for the apparatus has been placed with the General Electric Company.

The General Electric Company has sold the following apparatus: To the Standard Oil Company for installation at Richmond, Cal., five multi-stage centrifugal compressors, each consisting of one T. 3, 5555, 8, 4, 3900 r.p.m. compressor, driven by a 245-h.p. Curtis steam turbine, aranged for operation on 80 lbs. steam pressure, 27 inches vacuum.

W. L. Goodwin, general manager of the Pacific States Electric Company, announces that plans have been adopted for a six-story and basement building that will be completed by November 15th, for their exclusive use. The building will be erected on the south side of Mission street, east of Second, at an estimated cost of $80,000. The Mission-street front will be faced with pressed brick, terra cotta and tile, and there will be a rear frontage on Minna street. Automatic sprinklers, pneumatic tubes, two elevators and two high-speed electric hoists will render the building safe and convenient for the electrical supply business.

NEW CATALOGS.

The Electric Storage Battery Company has just issued bulletin No. 136 on storage batteries for railway cars. Illustrations are given of typical installations.

The Century Electric Company of St. Louis has just issued Bulletin No. 18 on single-phase, self-starting motors. The bulletin sets forth in a neat and attractive manner a description of the various motors manufactured by the company and illustrates their application in the industries.

Bulletin No. 4880, recently issued by the General Electric Company, describes that company's Signal Volt-Ammeter, known as the Type S-2. The instrument is used for testing direct current railway signal apparatus. Bulletin No. 4925 describes its Combined Unit Mercury Arc Rectifier Outfit. This outfit consists of the constant current transformer, direct current reactance, tube tank and exciting transformer mounted on a common base. Bulletin No. 4950, describes the Washington, Baltimore & Annapolis 1200 Volt Direct Current Railroad. This has now been operating as a 1200 volt road for over two years. Bulletin No. 4952, is devoted to a description of the Series Incandescent Street Lighting System as furnished by that company.

BOOK REVIEW.

Electrical Injuries, Their Causation, Prevention and Treatment.—By Chas. A. Lauffer, A.M., M.D. Size 4¼x6½ in.; 77 pages; cloth binding. Published by John Wiley & Sons of New York, and for sale by the Technical Book Shop, 106 Rialto Bldg., San Francisco. Price 50 cents.

This booklet is designed for the use of practical electrical men. The author is the medical director of the relief department of the Westinghouse Electric and Manufacturing Co., East Pittsburgh, Pa. Nation-wide interest has been manifested by electrical men in precautions leading to prevention of accidents, but particularly has this interest shown itself in the way of individuals so preparing themselves that effectual aid may be rendered comrades in the soul-harrowing scenes accompanying the electrical shock. This booklet first deals in the various electrical injuries that may arise; then follow notes on minor surgery and first aid. The last two discussions on infections and the effects of occupation on the health are particularly to the point. The booklet should find a ready welcome among those exposed to electric shocks.

NEWS NOTES

ILLUMINATION.

TACOMA, WASH.—The plant of the Tacoma Gas Company was damaged to the extent of $2000 in a recent fire.

HELENA, MONT.—A move is under way, fostered by the commercial club, to install electroliers in the business district.

LOS ANGELES, CAL.—Bids will be received up to July 26 for furnishing the city electrical equipment, according to specifications thereof.

SPOKANE, WASH.—The Spokane Gas Company proposes to give Hillyard a service by a $50,000 extension, if franchise can be secured.

ARTESIA, N. M.—The Artesia Light & Power Company has advertised for bids for installation of the first unit of a series of additions to the local plant.

LOST HILLS, CAL.—The San Joaquin Light & Power Company has finished connecting up the new line into the Lost Hills and electric lights and power are now available.

GLENDORA, CAL.—At a meeting of the City Council a resolution was passed providing for installation of a system of electric lights to illuminate the business section of town.

LOS ANGELES, CAL.—The substation of the Southern California Edison Company, located at Ninth street and the river has been destroyed by fire. The loss is estimated at about $10,000.

CITY OF MEXICO, MEX.—Contracts have been entered into by the Vera Cruz Electric Light, Power & Traction Company for a supply of power from the Puebla Tramway, Light & Power Company.

PORTLAND, ORE.—The franchise sought by the Northwestern Electric Company asking permission to operate in this city a plant for furnishing heat, light and power to consumers has been referred to the street commission of the executive board for fixing the valuation.

HOOD RIVER, ORE.—"Our company will develop 1500 horsepower by the completion of the big new flume that has been begun from the rapids of Hermann Creek," says G. A. Young, president of the Columbia River Power & Light Company, who was here on business. "We have been serving the citizens of Cascade Locks, near which our plant is located, with electric lights since last Thanksgiving by means of a temporary system we constructed. It is probable that within a short time some business enterprise will come to Cascade Locks and make use of the surplus power we are developing. Several companies are now considering our offer." The other officers of the newly-incorporated company are: M. Collins, manager, and R. W. Lang, secretary.

TELEPHONE AND TELEGRAPH.

ALBION, WASH.—The Pacific States Telephone Company has petitioned the council of Albion for a franchise to install a switchboard in the city.

COLFAX, CAL.—The Colfax Suburban Telephone Company has made arrangements for improvements of its system and to increase the efficiency of the service.

TAMPICO, MEXICO.—A concession has been applied for by John B. Body, managing director of S. Pearson & Sons, for the construction of a wireless telegraph station here.

SPOKANE, WASH.—The Inland Telephone & Telegraph Company with head offices in Spokane, commences this week the construction of long distance lines in the Inland Empire.

NORTH BEND, ORE.—R. P. Kehoe states that he and others are making preparations to build a modern telephone line in North Bend and that a franchise will be applied for immediately.

CLOVIS, N. M.—The equipment force of the Mountain States Telephone & Telegraph Company is enlarging the offices, adding to exchanges and otherwise improving the system at this place.

SOUTH PASADENA, CAL.—Bids will be received up to August 19, for a franchise to maintain for forty years, telephone and telegraph lines over and along the public streets and highways of said city.

SOUTH PASADENA, CAL.—A franchise has been granted the Home Telephone Company to construct telephone and telegraph wires for a period of 40 years. The grantee shall commence to build the system within 30 days.

LEWISTON, IDAHO.—The Inland Telephone & Telegraph Company will invade the Lewiston territory by the construction of lines between Spokane and Lewiston where connection will be made with the Nezperce Co-operative Telephone Company. The total cost of the line to be constructed will be approximately $125,000.

PASADENA, CAL.—Plant Engineer W. D. Moore considers that the two systems—the Pacific Telephone & Telegraph Company and the Home Telephone & Telegraph Company—are so nearly equal in size that it will be impossible to throw them into one exchange. Temporary connection must be established by placing cables from the Pacific office to the Home office. The cost will be $25,000.

OAKLAND, CAL.—Better telephone service was promised by officials of the Pacific States Telephone & Telegraph Company at a meeting of the City Council during the rate fixing investigation. It was practically decided that the rates now in force should continue in effect. Harry Brownlee, manager of the company, in response to a statement by Commissioner of Public Works Harry S. Anderson to the effect that the service of the telephone company had deteriorated, admitted that the acquirement of the Bay Cities Home Telephone Company's plant had overloaded the exchanges of the Sunset telephone service. Brownlee promised that within two weeks the service of the Pacific corporation would be raised to a higher standard.

SAN FRANCISCO, CAL.—The gross revenue of the Pacific Telephone & Telegraph Company for May was $1,505,493, compared with $1,257,477 for the corresponding month of 1911, an increase of $248,016. Net earnings for the month were $379,551, compared with $279,429 for May, 1911, an increase of $100,122. For the five months ended May 31, 1912, net earnings were $1,666,717 as against $1,369,658 for the first months of 1911, a gain of $297,059. This is an increase in net earnings of about 21 per cent for the five months. The company has been showing a steady increase in gross revenue for a number of years, the gross for 1911 being $16,070,112 against $7,884,071 in 1905. The company owns and controls the entire Bell telephone business on the Pacific Coast. The territory served is rapidly increasing in population and wealth and much larger earnings are confidently expected. Its territory includes such important and growing cities as San Francisco, Los Angeles, Seattle, Portland, Tacoma and Spokane, together with every other important city and town in the States of California, Washington and Oregon.

SAN FRANCISCO, CAL.—The Pacific Telephone & Telegraph Company has filed a complaint with the Railroad Commission against the Sierra & San Francisco Power Company. The complaint concerns the new power line which the Sierra company is constructing from a point near Coyote in Santa Clara County to Kings City in Monterey County. The telephone company charges that this high-tension power line will parallel its telephone line for a distance of approximately 46 miles in such close proximity as to interfere seriously with the operation of the telephone line. The telephone company contends that the power line paralleling its own line at an

average distance of 55 to 67 feet for 46 miles will interfere through induction and through disturbing elements to such an extent that the telephone line will be rendered unusable for the transmission of messages. It is stated further that the proximity of the power line will subject the employes of the telephone company to danger from electrical shocks and will endanger its property from fire caused by the undue current. The telephone company requests, therefore, that the Railroad Commission issue an order directing that the power line be constructed at least 1000 feet from the telephone line, and in such manner as will protect its employes and its property.

TRANSPORTATION.

SEATTLE, WASH.—The Supreme Court in a written opinion holds that the $800,000 bond issue for the construction of the municipal car line is legal.

VANCOUVER, WASH.—It seems certain that the proposed extension of the electric line from Sifton to Hockinson will be made soon. The necessary money can be secured.

LOS ANGELES, CAL.—Within three months two new branches of Pacific Electric lines will be completed connecting Los Angeles with San Fernando and Owensmouth via Van Nuys.

WARRENTON, ORE.—This place will probably grant a franchise to Geo. A. Robinson for an electric car line, who proposes to do considerable work of this nature in this vicinity.

COLTON, CAL.—Application has been made for a franchise granting the right to construct an electric railroad upon certain highways of Colton. Bids will be received up to July 31.

CHICO, CAL.—The train service on the Hamilton City branch of the Northern Electric road has been discontinued until about August 10 on account of the tearing up of the track for street improvements.

NAMPA, IDAHO.—Final arrangements for the work of constructing the 14 miles extension of the Idaho Traction Company line between Caldwell and Roswell have been finished, and work is about ready to start.

WEST VANCOUVER, B. C.—The council has ordered the B. C. Electric Railway to immediately start work on the construction of its electric line in this city, otherwise the franchise granted it some time ago will be canceled.

LOS ANGELES, CAL.—The Santa Fe Railroad is preparing to expend $10,000 for block signals in Southern California; to build and equip the electric generating plant to supply current to work automatic signals, the sum of $200,000 has been asked for by Coast Line officials.

VANCOUVER, B. C.—It is announced here that MacKenzie & Mann, of the Canadian Northern Railway, have secured control of the entire holdings (14 companies) of the Dominion Power & Transmission Company for a consideration bordering on $25,000,000. It is not known yet what changes are contemplated.

SACRAMENTO, CAL.—The Board of Supervisors passed an ordinance granting to the Oakland, Antioch & Eastern Railway a franchise to join in the construction, maintenance, use and operation of a certain combination railroad, wagon-road and foot passenger bridge across the Sacramento River from the foot of M street in the city of Sacramento.

VANCOUVER, B. C.—The International Railway & Development Company, capitalized at $50,000,000 English capital, has been organized to build numerous electric lines through lower B. C. The company will build a large dam across the Fraser River for the production of power. D. M. McDull is the company engineer. A plant to produce 100,000 h.p. is contemplated. The construction of an electric line from New Westminster to Ladner is contemplated and another from Ladner to this place.

SAN FRANCISCO, CAL.—A resolution introduced by Supervisor Vogelsang directing the Board of Works to give estimates of the cost and submit plans for extensions of the Geary street road from Kearny street to the outer tracks in Market street, opposite Sansome, and from Thirty-third avenue to the beach was passed. Vogelsang explained that this resolution would pave the way for these extensions and would also place all in readiness for the extension of the municipal railway down Market street to the ferry.

ASTORIA, ORE.—The town councils of Warrenton and New Astoria at special meetings held recently, passed ordinances granting George A. Robinson, a 30-year franchise for an electric railroad running through both towns. Each of the measures provides that the grantee shall pay a license of $100 a year, shall accept the franchise within 60 days and shall deposit $250 as a forfeit that he will begin construction within 90 days and will have the road to Seaside completed and in operation within one year.

VALLEJO, CAL.—The Vallejo & Northern Railroad will concentrate all its energies upon the construction of the division from Vallejo to Sacramento upon the completion of the Sacramento-Woodland divisions. This was the statement of President T. T. C. Gregory following a meeting by the board of directors, at which there were present President Gregory, Directors Ernest Holly, William Pierce and John W. Bauman of Suisun and W. R. Morden of Dixon, with Attorney Goodell of San Francisco. Work on the Vallejo-Sacramento division will be pushed from both ends.

SACRAMENTO, CAL.—T. T. C. Gregory, president of the Vallejo & Northern Railroad, has notified J. F. Barry, grand jury expert, that he will not permit an examination of the books on the ground that the grand jury has no right to go into the private affairs of electric companies. The idea of the proposed examination of accounts was to find out exactly what the cost of the M street bridge is. President Gregory has placed the cost at $380,000, while it is asserted testimony given at a trial of condemnation suit in Woodland recently the cost of the bridge was given as $270,000.

TRANSMISSION.

GREENVILLE, CAL.—Contracts have been let by the Droege Mining Company, composed of the Swedish syndicate, including E. O. Lindbloom, Linderbereger and others, for the furnishing of electric power by the Indian Valley Electric Light & Power Company. The power will be available for the Droege and other mines within two months. A temporary steam plant will be installed as an auxiliary to the present hydroelectric plant at Greenville. The steam plant will develop 200 h.p. It is expected, within a few months, to have Senaca power in the district from the Seneca plant to be built on the north fork of the Feather River by the company.

SAN FRANCISCO, CAL.—Permission has been given the Pacific Gas & Electric Company by the Railroad Commission to construct two new hydroelectric plants on the Bear River in Placer County, and build a power line from them to a point near Crockett on San Francisco Bay. The company will install four 10,000 kw. generators, and later increase the output to 100,000 kw., the power thus generated taking the place of that now purchased from the Great Western Power Company. About $5,000,000 will be required for the installation of the first 40,000—capacity and construction of the power line. The commission stated that it will probably now be necessary for the company to apply to the commission for permission to issue some of the stocks and bonds by the sale of which, according to a plan mapped out last year, the work will be financed.

SAN FRANCISCO, CAL.—The State Railroad Commission has issued an order granting for the most part the Oro Electric Corporation's application to extend its transmission lines

across the Sacramento Valley and the upper San Joaquin Valley into Alameda and Contra Costa Counties. The permission was based upon the condition that the bonds of the Oro Electric Corporation, now held by affiliated companies, be sold only with the consent of the commission. The utility proposes to extend its power lines now through Plumas, Butte, Yuba, Sutter, Colusa, Glenn, Yolo, Solano, Contra Costa, Sacramento, Calaveras, San Joaquin and Alameda counties. Incidentally, the corporation has agreed to reduce its Oroville rate, according to the commisson. When the Oro Electric applied for a certificate of necessity and convenience to extend its lines it encountered opposition from the Pacific Gas & Electric Company, the Western States Gas & Electric Company, the Northern California Power Company and the Vacaville Water & Light Company, all of which asked that the Oro be kept from their territory. The Oro's affiliated corporations are the Oro Water, Light & Power Company and the Oro Development Company.

WATERWORKS.

EL CENTRO, CAL.—An election will be called soon when the proposition of voting $40,000 bonds for extending the city water system will be voted upon.

SOUTH PASADENA, CAL.—Voters are to be asked to provide the necessary bonds at once to secure sewers, water and fire protection, roads and other public utilities.

PORTLAND, ORE.—The House has passed the Senate bill authorizing the sale to the city of Pendleton of 200 acres of Umatilla reservation lands for water supply purposes.

SAN DIEGO, CAL.—A call for a bond election to raise funds for the purchase of the entire water system has been issued by the City Trustees. The plan is to operate the system as a municipal project.

FULLERTON, CAL.—The City Attorney has been instructed to draw up a resolution of intention to call an election for issuance of $80,000 of bonds for the construction of a municipal waterworks system.

BURLINGAME, CAL.—Experts retained by the Board of Trustees have reported in favor of the municipal water system. It will cost $175,000 and it is the purpose of the Board to bond the city for this amount.

SPOKANE, WASH.—The Elk City Mines corporation, operating the South Fork property on the Clearwater river in the Elk City district, will spend between $10,000 and $15,000 in installing a water power plant this summer.

GLENDALE, CAL.—The matter of establishing a municipal water system is being thoroughly considered. It is estimated that if the city bond itself for the sum of about $300,000 it will be possible to secure various systems now supplying the city.

REDLANDS, CAL.—A committee recommends that the City Trustees offer the Domestic Water Company the sum of $165,000 for entire water plant, except the gravity water and Citrus avenue property, and that the sale offer remain open until August 1.

LAS VEGAS, N. M.—The Augua Pura Company is engaged in the construction of a long canal to be used as an inlet for a new reservoir in Peterson canyon and is also contemplating other improvements. A new contract for furnishing water to the city may be signed.

HILLSBORO, ORE.—The Washington-Oregon Corporation has been unanimously granted a franchise to lay its pipes from Sain Creek to Hillsboro, in and across the county roads. The company's first offer was for a maximum of 35,000 gallons, but the board held for 50,000 and this was accepted on the part of the water people.

MILWAUKIO, ORE.—At an adjourned meeting of the Council a petition was received asking that a special election be called in September to vote on an issue of bonds up to $40,000 with which to establish a city water plant by purchasing of the present waterworks or construction of new works.

HOOD RIVER, ORE.—At the meeting of the Council a resolution was passed authorizing the advertisement for the sale of $36,000 water bonds; the sum is to be used in caring for the warrants issued in payment of the water system secured from the Pacific Power & Light Company through condemnation proceedings.

RIVERSIDE, CAL.—The City Council has entered into an agreement with the firm of Burns & McDonnell, hydraulic engineers of Kansas City, for an investigation of local water systems, with a view to securing recommendations for needed extensions and improvements, and the amount that would be needed to be raised by a bond issue to convert these plants into a municipal system.

HOOD RIVER, ORE.—Citizens of Underwood plan on beginning work soon on a water system to supply the homes of the entire vicinity. They have filed on the water of Moss Creek for this purpose. The expense of laying mains will be taken care of by a bond issue. Funds have already been provided for preliminary work and a hydraulic engineer will soon be on the ground to make surveys.

HONOLULU, H. T.—The Department of Public Works will now turn its attention to the waterworks, and with the flotation of the new bond issue will expend over a quarter of million dollars. Superintendent Campbell announces that with the approval of the bond issue tenders for new pumps and other machinery will be called for at once in order to call the bids before the department as soon as the money is available. The exact sum to be spent on the waterworks will be $265,000.

ESCONDIDO, CAL.—The City Trustees have adopted a resolution to sign a tentative agreement submitted by the directors of the Mutual Water Company for a better water supply. The agreement contemplates the purchase by the city of all distributing mains and the city reservoir, and improvement on same, the expense of both to be borne by a bond issue. It also provides for the company building an additional reservoir or raising of the present one, located seven miles east of the city.

LAKEPORT, CAL.—The Yolo County Water & Power Company has recorded here a lengthy document placing in trust with the Oakland Bank of Savings their interests in the waters of Clear Lake and the lands bordering them, preparatory to starting the sale of a $10,000,000 bond issue in bonds of the denomination of $1000 each. The action of the company creating the trust is presumably for the purpose of raising funds to carry out their project for impounding the waters of the lake for irrigation and power purposes. The title which the company has to any of the water or land of the lake is in dispute and it is stated by Attorney H. E. Witherspoon, who represents D. W. Shetler, the party opposing the Yolo company in the Lake litigation, that before the company can lawfully sell any bonds, it must prove title to the lake property and rights involved.

SAN FRANCISCO, CAL.—Reports to Chief Engineer Murphy from officers of the fire department in regard to the lack of sufficient pressure in many hydrants have been filed with the Supervisors. Battalion Chief Grote reported that very little water was obtainable from the hydrants on Geary street, at Thirty-ninth and Fortieth avenues, on June 16, when a building there burned down. One of the hydrants was abandoned as useless, and only a small stream could be got from the other. Capt. Geo. R. Lawson reported that on June 19 no water could be got from the hydrant on Rhode Island street, between Eighteenth and Nineteenth, and his company could do nothing. A fire on that date proved very disastrous. Henry Rice, former hydrant man, reported that the hydrant at Leavenworth and Francisco streets, had been dry for some time, the water not reaching it because of the lowness of the reservoir at Francisco and Bay streets. Chief Murphy also gives a long list of hydrants throughout the city where the water pressure is low.

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